

**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
BUREAU OF BEACHES AND COASTAL SYSTEMS**

STRATEGIC BEACH MANAGMENT PLAN

for the

SOUTHWEST GULF COAST REGION

SUBREGIONS

Pinellas Barriers

Sarasota Barriers, North Reach

Sarasota Barriers, South Reach

Manasota Barriers

Charlotte Harbor Complex

Estero Barriers

Naples Coast

Southern Barriers

PINELLAS BARRIERS

There are 39.3 miles of beaches in the **Pinellas Barriers** subregion, which extends from Anclote Key in Pasco County to the Southwest Channel entrance to Tampa Bay in Hillsborough County, as shown on Figure SW.1. There are 21.4 miles of critically eroded beaches in this subregion, of which 14.2 miles have been restored.

Erosion is attributed to winter frontal systems, tropical storms and hurricanes, and the effects of inlets including Hurricane Pass, Clearwater Pass, Johns Pass, Blind Pass, Pass-a-Grille, Bunces Pass, and Egmont Channel. The most erosive storms in recent years were Hurricane Agnes (1972), subtropical storms in June of 1974 and June of 1982, Hurricane Elena and Tropical Storm Juan (1985), Tropical Storm Josephine (1996), and Hurricanes Frances and Jeanne (2004).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

HONEYMOON ISLAND, PINELLAS COUNTY, R6-R12

This is a 1.4 mile segment of critically eroded beach on the southern gulf shoreline of Honeymoon Island at Honeymoon Island State Park. In 1969, over one million cubic yards of sand and limestone was placed along the gulf shoreline of Honeymoon Island (R8-R12) using 230,000 cubic yards of material from a nearshore borrow area. A groin field was constructed near the south end of the beach fill. In 1989, beach nourishment was conducted using sand from an upland source. Feasibility studies completed in 1999 and 2005 recommended beach nourishment and a terminal structure. Maintenance dredging of the Hurricane Pass navigation channel was conducted in 2000 with the placement of approximately 12,500 cubic yards of beach quality material between R10 and R12.

Phase 1 of the non-federal **Honeymoon Island Beach Restoration Project** (R8-R10.5) was completed in December 2007 using 130,000 cubic yards of sand from the ebb tidal shoal of Hurricane Pass. The project design consists of debris removal and a beach berm at elevation +5 ft NGVD. The existing concrete geotextile container groin located just north of R10 was reconstructed as a lower profile rubble mound structure. The groin was extended in length and a T-head added.

Strategy: Maintain the project through monitoring and nourishment using sand from bypassing and offshore sources; identify offshore sand sources and design and construct the expanded project (Phase 2).

HURRICANE PASS, PINELLAS COUNTY, R15-R16

Hurricane Pass is a natural inlet where a navigation channel was dredged in 1989. A feasibility study of navigation improvements was completed in 1999; this study recommended maintenance dredging and placement of the dredged sand on Honeymoon Island. Maintenance dredging of the navigation channel was conducted in 2000 with the excavation of approximately 12,500 cubic yards of beach quality material that was placed on the beach on Honeymoon Island. Approximately 130,000 to 155,000 cubic yards of beach quality sand from the ebb tidal shoal is scheduled for placement on Honeymoon Island in 2007.

Strategy: Place beach compatible sand from maintenance dredging on the adjacent eroded shoreline of Honeymoon Island.

CLEARWATER BEACH ISLAND, PINELLAS COUNTY, R47-R49

This is a 0.5 mile segment of critically eroded inlet shoreline beach on the inlet shoreline of Clearwater Beach Island adjacent to Clearwater Pass. Most of this area has been armored with concrete bulkheads. In 1986, private property owners along the inlet shoreline constructed five rubble mound groins to stabilize the inlet beach. Groin construction has stabilized pocket beaches. Private interests maintain the pocket beaches for recreational purposes.

Strategy: Monitor.

CLEARWATER PASS, PINELLAS COUNTY, R47-R51

Clearwater Pass is a stabilized inlet maintained by the U.S. Army Corps of Engineers. Dredging of the navigation channel was completed in 1961. Initially, material from maintenance dredging of the navigation channel was disposed in the gulf and harbor. In 1973 and 1977, beach compatible dredged material was placed on the Sand Key shoreline south of the pass. Between 1981 and mid-1984, nearly one million cubic yards of beach compatible dredged material was placed on the Sand Key shoreline (R51-R60) using sand from a navigation improvement project. Since 1985, the entrance channel has not required dredging to maintain design channel depths. In 1994, maintenance dredging of the Gulf Intracoastal Waterway produced approximately 7,000 cubic yards of sand which was truck hauled to Sand Key Park.

Strategy: Monitor; conduct an inlet management study.

SAND KEY, PINELLAS COUNTY, R56-R115.4

This is an 11.3 mile segment of critically eroded beach on the gulf shoreline of Sand Key. Beach restoration and nourishment have been conducted throughout this area, except at the Town of Belleair Shores (R66-R71), Redington Beach (R109-113) and Madeira Beach (R114), where a groin field was constructed by local interests in the late 1950's

The federal **Pinellas County Beach Erosion Control Project** authorizes beach restoration and nourishment of Clearwater Beach Island, Sand Key, and Treasure Island, and nourishment of Long Key. The local sponsor is Pinellas County. The federal authorization provides that the various island segments can be constructed together or independently as separate projects. The project design of the Sand Key segment consists of a beach berm at elevation +6 ft NGVD to protect the existing dune and upland development. The Town of Belleair Shores (R66-R71) chose not to participate in the shore protection project.

The Sand Key segment was restored in four construction phases between 1988 and 1998. Previously, a breakwater was constructed in 1986 at Redington Shores (R101). In 1988, restoration at Redington Shores and the northern 0.8 miles of North Redington Beach (R99-R107) was completed using sand from the Johns Pass ebb shoal. In 1990, restoration at Indian Rocks Beach (R72-R85) was completed using sand from the Egmont Channel Shoal. In 1992, restoration at Indian Shores (R85-R99) was completed using sand from the Egmont Channel Shoal. In 1998, restoration of Belleair Beach and the southern 0.8 miles of Clearwater Beach (R56-R66) on Sand Key was completed. The Sand Key restoration project included construction of 7.95 acres of artificial reef to mitigate for adverse impacts to nearshore hardbottom.

During a second phase of construction in 1999, nourishment between R71-R107 of Sand Key was completed using sand from the Egmont Channel Shoal. In response to the 2004 hurricane season, nourishment of the entire Sand Key segment (R56 to R66 and R71 to R107) of the Pinellas County Beach Erosion Control Project was accelerated with construction completed in August of 2006.

Pinellas County Beach Erosion Control Project – Sand Key Segment

| Date Completed | Volume | Sand Source | Location | Length |
|-----------------------|-----------------------|----------------------|----------------------|---------------|
| July 1988 | 529,150 cubic yards | Johns Pass ebb shoal | R99-R107 | 0.8 miles |
| December 1990 | 1,300,00 cubic yards | Egmont Channel Shoal | R72-R85 | 2.6 miles |
| December 1992 | 850,000 cubic yards | Egmont Channel Shoal | R85-R107 | 4.2 miles |
| 1998 | 2,612,166 cubic yards | Egmont Channel Shoal | R56-R66 | 8.6 miles |
| October 1999 | | | R72-R107 | |
| August 2006 | 1,700,000 cubic yards | Egmont Channel Shoal | R56-R66 and R71-R107 | 8.6 miles |

Strategy: Maintain project through monitoring and nourishment using bypassing and offshore sources.

JOHNS PASS, PINELLAS COUNTY, R125-R126

Johns Pass is a stabilized inlet with a federal navigation channel maintained by the U.S. Army Corps of Engineers. Maintenance dredging of the entrance channel is conducted every five to ten years as needed and bypassed to the Treasure Island beaches. The ebb shoal has been used as a sand source for several nourishment projects. The management strategy listed below is based in part upon a 1993 inlet management study. A terminal structure was built in 2000 on the south side of the Pass to stabilize the Treasure Island project and minimize sediment transport into the Pass.

Strategy: Continue to use the channel and ebb shoal as a sand source for beach nourishment of Treasure Island.

TREASURE ISLAND, PINELLAS COUNTY, R126-R143

This is a 3.5 mile segment of critically eroded beach on Treasure Island. The Treasure Island segment (R126-R143) of the federal **Pinellas County Beach Erosion Control Project** was restored in 1969. The local sponsor is Pinellas County. The project design consists of a beach berm at elevation +6 ft NGVD to protect the existing dune and upland development.

Nourishment along short segments of shoreline has been conducted every three to five years using sand from Blind Pass, Pass-A-Grille, an offshore borrow area and the Egmont Channel Shoal, in addition to the bypassing of maintenance dredged material from Johns Pass. Nourishment has created a wide beach along the central gulf shoreline (R128-R138). The construction of a groin near R141 in 1976 and the extension of the groin on the north side of Blind Pass (R143) during 1983 stabilized the southern segment of gulf shoreline. In 1996 and 2000, nourishment was conducted within a localized area of erosion between R138 and R144 using sand from the Johns Pass navigation channel and the Egmont Channel Shoal borrow area. A terminal groin at the north end of the island was constructed in 2000.

In response to the 2004-2005 hurricane seasons, nourishment of the Treasure Island segment (R126-R143) of the federal Pinellas County Beach Erosion Control Project was accelerated. Construction was completed in September 2006 using sand excavated from the Egmont Channel Shoal.

For emergency interim purposes only, the City of Treasure Island is authorized to excavate up to a maximum of 134,000 cubic yards of sand from the beach between R130.5 and R133 with placement between R136 to R141 and between the south jetty at John's Pass to R128. The borrow area shall not be

excavated to a cut depth to exceed -3.0 NGVD and the berm elevation at the fill sites shall be no more than +5 NGVD.

Pinellas County Beach Erosion Control Project – Treasure Island Segment

| Date Completed | Volume | Sand Source | Location | Length |
|-----------------------|---------------------|-------------------------------|--------------------------------|---------------|
| 1969 | 790,000 cubic yards | Offshore borrow area | R132-R141 | 1.8 miles |
| 1971 | 75,000 cubic yards | O'Brien's Lagoon | R131-R132 | 0.2 miles |
| 1972 | 155,000 cubic yards | Blind Pass | R140-R141 | 0.2 miles |
| 1976 | 50,000 cubic yards | Offshore borrow area | R135-R142 | 1.4 miles |
| December 1978 | 32,000 cubic yards | Blind Pass | Southern Treasure Island | |
| 1981 | 53,500 cubic yards | John's Pass | R127-R130 | 0.6 miles |
| 1982 | | | R129-R132 | 0.6 miles |
| 1983 | 262,000 cubic yards | Blind Pass | R138-R142 | 0.8 miles |
| 1986 | 550,000 cubic yards | Pass-a-Grille shoals | R129-R141 | 2.4 miles |
| 1991 | 56,000 cubic yards | John's Pass | R127-R129 | 0.4 miles |
| 1996 | 51,300 cubic yards | Egmont Channel Shoal | R138-R144 | 0.4 miles |
| August 2000 | 390,000 cubic yards | John's Pass and Blind Pass | R126-R129 and R136-R144 | 1.6 miles |
| October 2004 | 225,000 cubic yards | Pass-a-Grille shoals | R136-R141 | 1 mile |
| August 2006 | 180,000 cubic yards | Egmont Channel Shoal | R128, R136- R141 | 3.5 miles |

Strategy: Maintain the project through monitoring and nourishment with sand from Johns Pass, or if using sand from Egmont Channel Shoal, in conjunction with nourishment of other project segments.

BLIND PASS, PINELLAS COUNTY, R143-144

Blind Pass is a stabilized inlet without a maintained navigation channel. The channel and ebb shoal have been dredged every four to five years by the U.S. Army Corps of Engineers as a sand source for nourishment on Treasure Island and Long Key. In 1983, the terminal jetty on the north side of Blind Pass (R143) was extended seaward. In 1986, an attached breakwater was constructed as an extension to the south jetty. The management strategy listed below is based in part upon a 1992 inlet management study. In 2006, the south jetty was sand tightened by placing additional armor stone to close the existing 40 foot gap between the jetty and the detached breakwater.

Strategy: Continue to use channel and ebb shoal as borrow area for nourishment at areas of greatest need on Treasure Island and Long Key.

LONG KEY, PINELLAS COUNTY, R144-R166

This is a 4.1 mile segment of critically eroded beach on Long Key. Nourishment is conducted at Upham Beach (R144.5-R146) on the northern gulf shoreline and Pass-A-Grille Beach (R160-R166) on the southern gulf shoreline. Shore protection structures have been built at the north and south ends of the island.

Nourishment of the northern gulf shoreline (R144-R147) of the Long Key segment of the **Pinellas County Beach Erosion Control Project** has been conducted at least every five years since 1980 using sand from Blind Pass, Pass-A-Grille and Egmont Channel Shoal. The local sponsor is Pinellas County. The project design consists of a beach berm at elevation +6 ft NGVD to protect the existing dune and upland

development. Despite construction of the breakwater extension to the south jetty at Blind Pass, severe erosion continued along the northern gulf shoreline. In 1998, the U.S. Army Corps of Engineers studied the use of a groin field to slow erosion of the beach fill, but determined that it would not meet the economic requirements of the federal project authorization. Nourishment using sand from Blind Pass and John's Pass was completed in 2000.

Approximately 75,000 cubic yards of beach quality sand was placed on Pass-a-Grille Beach in November, 2004, to restore approximately 5,000 feet of beach that was impacted by Hurricane Frances and Jeanne. The borrow area for this project was the Pass-a-Grille Channel

In January 2006, Pinellas County completed the construction of five geotextile T-head groins in the vicinity of Upham Beach (R144.5-R146). Each T-head groin consists of a series of stacked geotextile sand-filled tubes. In order to mitigate for impacts to the downdrift beach, 85,000 cubic yards of beach fill was placed in conjunction with the 2004 federal maintenance nourishment project.

Nourishment of the Long Key segment (R144-R146) of the federal **Pinellas County Beach Erosion Control Project** was accelerated with construction completed in September of 2006.

Pinellas County Beach Erosion Control Project – Long Key Segment

| Date Completed | Volume | Sand Source | Location | Length |
|-----------------------|---------------------|-------------------------------|-----------------------|---------------|
| March 1980 | 254,000 cubic yards | Blind Pass | R144-R146 | 0.5 miles |
| October 1986 | 97,000 cubic yards | Pass-a-Grille Ebb Shoal | R144-R146 R160-165 | ¼ miles |
| January 1991 | 230,000 cubic yards | Blind Pass | R144-R146 | 0.4 miles |
| June 1996 | 253,000 cubic yards | Egmont Channel Shoal | R144-R146 | 0.4 miles |
| May 2000 | 359,000 cubic yards | Blind Pass and John's Pass | R144-R146 | 0.5 miles |
| August 2004 | 366,000 cubic yards | Pass-a-Grille borrow area | R144-R148 | 0.7 miles |
| September 2006 | 124,000 cubic yards | Egmont Channel Shoal | R144-R146 | 0.2 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from inlet bypassing and offshore sources; monitor performance of the groin field at Upham Beach; conduct feasibility study to assess the replacement of groin field with permanent structures.

PASS-A-GRILLE, PINELLAS COUNTY, R166-168

Pass-A-Grille is a natural inlet that has a federal navigation project through it. Navigation improvements to the authorized channel were completed in 1966. Dredged material from Pass-a-Grille Pass was placed on Long Key in 1986. Dredging of the Pass-a-Grille ebb shoal was conducted in 2004 with the sand used to nourish Upham Beach, Sunset Beach, and Pass-a-Grille Beach. Maintenance dredging has not been required to maintain navigable depths.

Strategy: Continue to use channel and ebb shoal as borrow area for nourishment at areas of greatest need on Long Key; monitor.

MULLET KEY, PINELLAS COUNTY, R176-R182

This is a 1.1 mile segment of critically eroded beach at the south end of Mullet Key. Mullet Key is managed by Pinellas County as Ft. DeSoto Park. In 1973, a federal beach erosion control project was constructed at Mullet Key that consisted of beach restoration along the gulf shoreline (R173-R179) using 700,000 cubic yards of sand obtained from the Egmont Channel. The project included construction of a groin and revetment at the southwest point of the island. In 1977, beach nourishment was conducted along the project area and along the bay shoreline (R181-R191) using sand from channel deepening in Tampa Harbor. The federal project was deauthorized in 1990.

In conjunction with the 2006 maintenance dredging of Tampa Harbor, the U.S. Army Corps of Engineers placed approximately 350,000 cubic yards of sand (R177-R179.5 and R181-R183) and rehabilitated the groin at the southwest point of the island.

Strategy: Maintain the beach with suitable and available material from navigational dredging; monitor.

EGMONT CHANNEL, HILLSBOROUGH COUNTY

Egmont Channel is located between Mullet Key and Egmont Key. Sand dredged from the Egmont Channel Shoal has been used for several nourishment projects and appears to contain a substantial quantity of sand for future project needs in the area over the next 15 years.

Strategy: Monitor.

EGMONT KEY, HILLSBOROUGH COUNTY

This is a 1.6-mile segment of critically eroded beach on the island of Egmont Key. Egmont Key is federal land managed by the State of Florida's Division of Recreation and Parks as Egmont Key State Park. In 1997, Pinellas County and the state conducted a feasibility study to evaluate long term solutions to the erosion threatening historical and natural resources on the island. The study recommended beach restoration with erosion control structures. Due to the lack of a local sponsor, the recommendations of this feasibility study were not pursued. As an interim measure, sand placement using maintenance dredged material from the St. Petersburg Harbor navigation project and construction of two sand-filled geotextile groins occurred in 2000.

During the 2004 hurricane season, the geotextile tube groins were damaged. In 2006, the two sand-filled geotextile tube groin structures on the north end of Egmont Key were reconstructed in conjunction with sand placement using maintenance dredged material from the federal Tampa Harbor Navigation Project. This event placed approximately one million cubic yards of sand on the beach and in the nearshore of Egmont Key.

In January 2002, a federal feasibility study began to examine erosion protection for the historic structures located on the west side of the Island. This feasibility study is currently underway. Completion is dependent on federal funding being available.

Strategy: Complete the federal feasibility study; initiate an annual monitoring program; maintain the beach with suitable material from navigational dredging.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Pasco County, Pinellas County, Clearwater, Belleair Beach, Belleair Shores, Indian Rocks Beach, Hillsborough County, Indian Shores, Redington Shores, North Redington Beach, Redington Beach, Madiera Beach, Treasure Island, St. Petersburg Beach and the U. S. Army Corps of Engineers. Participants with the Department as sponsors of beach management projects include Pinellas County and the U.S. Army Corps of Engineers. This area contains several islands managed by the Department's Division of Recreation and Parks, including Anclote Key, Three Rooker Bar, Honeymoon Island, and Caladesi Island. In addition, public park lands on Mullet Key are managed by Pinellas County. Egmont Key is a Florida State Park that is cooperatively managed by the Florida Department of Environmental Protection's Division of Recreation and Parks, U.S. Fish & Wildlife Service, and the U.S. Coast Guard. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple beach nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include:

1. Continue a sediment management strategy that uses beach compatible sand from maintenance dredging of navigation projects in the maintenance of projects.
2. Continue to link project segments, such as Treasure Island and Long Key, for construction and continue to implement the regional monitoring program of the combined projects.
3. Further investigation is needed to determine if maintenance dredged material from the Tampa Harbor or other federal navigation projects could be placed in the nearshore zone adjacent to the Egmont Key gulf shoreline.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, manatees, shorebirds, hardbottom, seagrasses and their habitats are primary environmental concerns within this subregion. The timing of construction activities has not been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. Artificial reefs as mitigation to offset adverse impacts to nearshore hardbottom caused by the Sand Key project have been constructed. The Pinellas County Aquatic Preserve's boundaries extends offshore of the Pinellas County shoreline into the Gulf of Mexico. The Boca Ciega Bay Aquatic Preserve boundary extends seaward out to 100 yards from the mean high water line along the western and southern shorelines of Mullet Key. Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.

During the Tampa Bay oil spill of August 1993, the beaches and nearshore areas at the project site were inundated by oil. Oil from this spill was encountered while dredging Blind Pass in 1999; however, no such contaminated sediment was discovered during either the subsequent dredging of John's Pass, which is the next inlet to the north of Blind Pass, nor during the dredging of Pass-a-Grille Channel in 2004, the inlet to the south. An environmental cleanup lead by the U.S. Coast Guard and the US Army Corps of Engineers removed the oil from the pass. The County and the U.S. Army Corps of Engineers are currently conducting a study to investigate the presence of oil in Blind Pass with the goal of utilizing Blind Pass for the next nourishment of Upham Beach.


SANDSOURCES

A feasibility study identified several potential borrow areas for beach restoration and nourishment of Honeymoon Island, but additional investigation during the design of Phase 2 is necessary to define the borrow areas. The Egmont Channel Shoal has been used for several beach nourishment projects and appears to contain a substantial quantity of sand for future project needs over the next 15 years. Additional investigation of offshore areas off Sand Key has been completed. Most of the maintenance dredged material obtained from the Tampa Harbor navigation project is placed in confined upland disposal sites or an open water offshore disposal area because its excessive silt content is not suitable for beach placement. A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation projects should continue to be incorporated into the maintenance of the beach restoration projects.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:




- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans



*Bureau of Beaches
and Coastal Systems*

Southwest Gulf Coast

Pinellas Barriers
**Anclote Key in Pasco County
 to Hillsborough-Manatee County Line
 (Southwest Channel)**

-  Subregion Boundary
-  R-20 Range Monument
-  Critically Eroded Beach



GULF OF
MEXICO

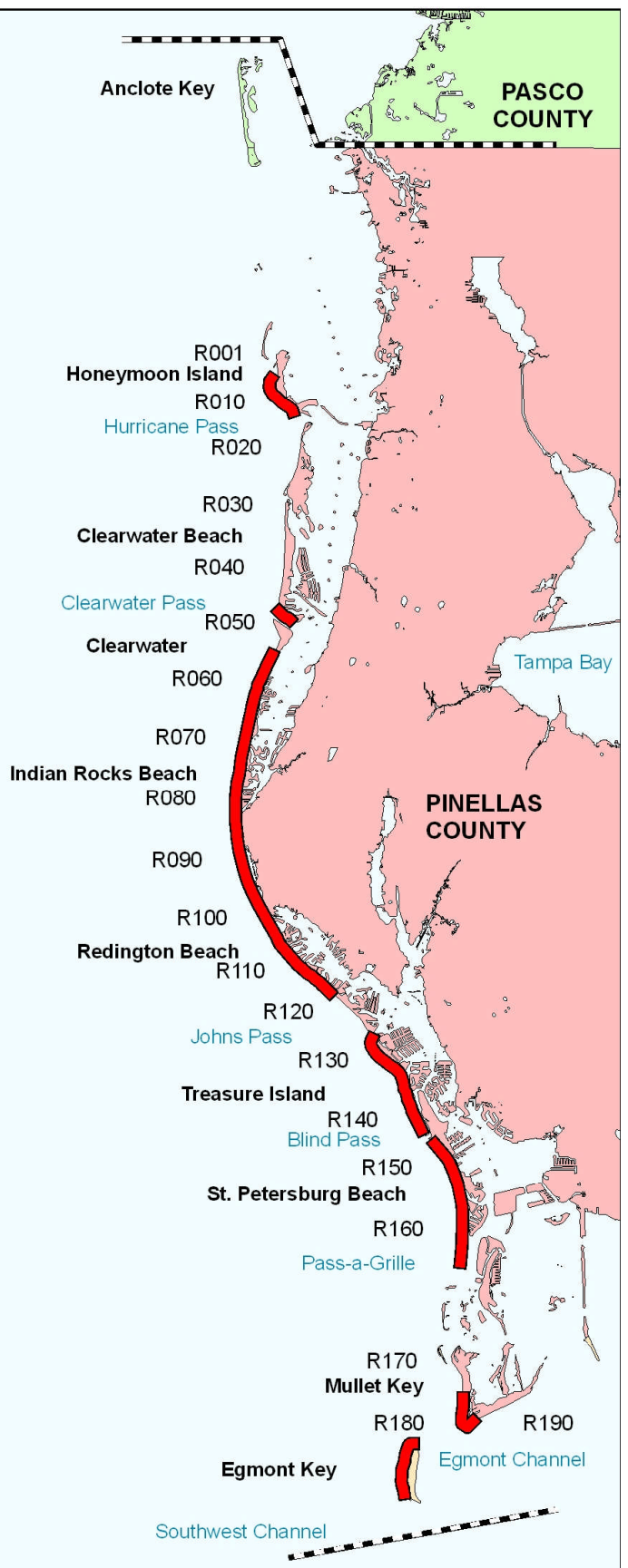


Figure SW.1: Pinellas Barriers

REFERENCES

Clark, R.R. et al, 2004. *Hurricane Frances & Hurricane Jeanne: Post-Storm Beach Conditions and Coastal Impact Report with Recommendations for Recovery and Modifications of Beach Management Strategies*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, 93 p.

Clark, R.R., and West, S., 1996. *Tropical Storm Josephine, October 7, 1996, Storm Damage Summary*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, Post-Storm Report, 11 p.

Clark, R.R., 1986. *The Impact of Hurricane Elena and Tropical Storm Juan on Coastal Construction in Florida*, Florida Department of Natural Resources, Division of Beaches and Shores, Post-storm Report No. 85-3, 142 p.

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Division of Beaches and Shores, 33 p.

Coastal Planning & Engineering, Inc., 1997. *Egmont Key Erosion Control Project Feasibility Study*.

Coastal Planning & Engineering, Inc., 1992. *Blind Pass Inlet Management Plan*.

Coastal Technology, Inc., 2001. *Engineering Analysis of Proposed "Sand Sharing" Project for City of Treasure Island*. 22p.

Coastal Technology, Inc., 1993. *John's Pass Inlet Management Plan*.

Croop, Jason, et. al. 2002. *Draft Environmental Assessment: Alternative Sand Source Utilization for the Pinellas County Beach Erosion Control Project*, Dial Cordy and Associates, Inc.

Davis, R.A. and Wang, P., 1997. *Sand Key Beach Nourishment Monitoring, Phases I-III Final Report*, Coastal Research Laboratory, Department of Geology, University of South Florida.

Elko, N.A., and Davis, R.A., 2000. *Sediment Budget for Treasure Island Pinellas County, Florida*. Coastal Research Laboratory, Department of Geology, University of South Florida. 42 p.

Florida Department of Environmental Protection. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, June 2007.

Humiston and Moore Engineers, 2005. *Evaluation of the Coastal Processes of Honeymoon Island and Inlet Dynamics of Hurricane Pass*, 38 p.

Moffatt & Nichol Engineers, Inc., 1999a. *Preliminary Engineering Evaluation for Honeymoon Island and Dunedin Causeway Beach Restoration*.

Moffatt & Nichol Engineers, Inc., 1999b. *Preliminary Engineering Evaluation for Hurricane Pass Navigation Improvements*.

U.S. Army Corps of Engineers, 2006. *Pinellas County, Shore Protection Project Long Key and Treasure Island Segments: 2004 Beach Renourishment 1st Annual Monitoring Report*.

U.S. Army Corps of Engineers, 2001. *Environmental Assessment: Maintenance Dredging and Beneficial Use of Dredged Material*, 32 p.

U.S. Army Corps of Engineers, 2000. *Pinellas County, Florida Beach Erosion Control Project Long Key and Treasure Island Segments June 1996 Beach Renourishment: Monitoring Report #3 Third Annual Monitoring*.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.

U.S. Army Corps of Engineers, 1995. *Feature Design Memorandum, Northern Treasure Island, Pinellas County, Florida, Beach Erosion Control Project*.

U.S. Army Corps of Engineers, 1997. *Pinellas County, Florida, Beach Erosion Control Project, 1st Renourishment, Sand Key Segment, Design Memorandum with Environmental Assessment*.

U.S. Army Corps of Engineers, 1984. *Beach Erosion Control Project Review Study and Environmental Impact Statement for Pinellas County, Florida*.

U.S. Army Corps of Engineers, 1971. *General and Detail Design Memorandum, Mullet Key, Florida, Beach Erosion Control Project*.

U.S. Army Corps of Engineers, 1966. *Beach Erosion Control Study on Pinellas County, Florida*.

U.S. Fish and Wildlife Service, 2006. *Biological Opinion for the proposed dredging of Tampa Harbor located in Hillsborough County and Beach Disposal on Mullet Key located in Pinellas County, Florida*, FWS Log No: 41910-2006-F-0692, 25p.

U.S. Fish and Wildlife Service, 2005 (updated 2006). *Biological Opinion Sand Key, Pinellas County, Florida*, FWS Log Number 05-627 (update Log Number 41910-2006-F-0480) , 5p.

SARASOTA BARRIERS NORTH REACH

There are 21.4 miles of beaches in the **Sarasota Barriers North Reach** subregion, which extends from the Southwest Channel entrance to Tampa Bay in Manatee County to Sarasota Point (R45) on the northwest end of Siesta Key in Sarasota County, as shown on Figure SW.2. There are a total of 21.2 miles of critically eroded beaches in this subregion (12.1 miles in Manatee County and 7.8 miles in Sarasota County), of which 16.4 miles have been restored and maintained.

Erosion is attributed to winter frontal systems, tropical storms and hurricanes, and the effects of the inlets including Passage Key Inlet, Longboat Pass, New Pass, and Big Sarasota Pass. The most erosive storms in recent years were the "No-Name Storm" in 1982; Hurricane Elena and Tropical Storms Bob and Juan (1985); Tropical Storm Josephine (1996); Hurricanes Frances, Ivan and Jeanne (2004); and Hurricane Wilma (2005).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

COUNTYWIDE STUDIES AND PROJECTS

In 2003, the Sarasota and Charlotte County Beach Restoration Study was completed. The purpose of the study was to investigate the extent and nature of Gulf shoreline erosion and examine the technical, regulatory and financial feasibility of large scale erosion control actions for consideration in the development of the Strategic Beach Management Plan. The study area included all of the unincorporated shoreline of Sarasota County and Charlotte County to Gasparilla Pass. The Town of Longboat Key, the City of Sarasota, the City of Venice and Gasparilla Island were excluded because they have pursued their own studies and erosion control projects. The study area totals more than 32 miles of shoreline and represents an effort by the State to address these issues on a regional basis.

NORTH ANNA MARIA, MANATEE COUNTY, R1-R2

This is a 0.2 mile segment of critically eroded inlet shoreline located on the north end of Anna Maria Island. In 2007, a feasibility study was completed which studied the expansion of the Manatee County Shore Protection Project to the north.

Strategy: Monitor.

ANNA MARIA ISLAND, MANATEE COUNTY, R2-R41

This is a 7.3 mile segment of critically eroded beach comprising the entire gulf shoreline of Anna Maria Island. The federal **Manatee County Shore Protection Project** authorizes restoration along 3.2 miles of the central Anna Maria Island gulf shoreline and nourishment of the entire 7.5 miles of gulf shoreline (R2-R41). The local sponsor is Manatee County. The federal project design consists of a beach berm at elevation +5 ft NGVD to protect the existing dune and upland development.

In 1993, restoration was completed at Holmes Beach and Bradenton Beach (R12-R36) using sand from an offshore borrow area. The construction of the restoration project directly impacted hardbottom and included construction of 7.3 acres of artificial reef to mitigate for adverse impacts to nearshore hardbottom. In May 2002, the first project was completed along the north end of the island (R7-R10) and along Holmes and Bradenton Beaches (R12-R36) using sand from an offshore borrow area. In response to the 2004 hurricane season, nourishment of the federal **Manatee County Shore Protection Project** was accelerated

with construction completed in the summer of 2006. Due to contractor difficulties and the marine turtle nesting season, the design template was not fully nourished in 2006.

Environmental monitoring of the effects of the restoration project on hardbottom indicated that impacts occurred as a result of the 1993 project beyond those impacts mitigated by the construction of the 7.3 acres of artificial reef. In order to mitigate for the additional impacts and for impacts to hardbottom from the extension of the 2002 project, the local sponsor constructed an additional 0.44 acres of artificial reef.

Manatee County Shore Protection Project

| Date Completed | Volume | Location | Length |
|-----------------------|-----------------------|--------------------|---------------|
| February 1993 | 2,300,000 cubic yards | R12-R36 | 4.6 miles |
| May 2002 | 1,900,000 cubic yards | R7-R10 and R12-R36 | 5.2 miles |
| June 2006 | 213,000 cubic yards | R12-R32 | 4.6 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources; restore the critically eroded beach from R10 to R12; place beach quality sand from maintenance dredging of the navigation projects in areas of greatest need.

LONGBOAT PASS, MANATEE COUNTY, R41-R42

Longboat Pass is a federal navigation project. Initial dredging of the authorized channel was completed in 1977. Maintenance dredging of the channel has been conducted every three to five years. The dredged sand is placed on the adjacent gulf shorelines of Anna Maria Island and Longboat Key in the areas of greatest need. A feasibility study was initiated in 2006 by the State and the West Coast Inland Navigation District to evaluate alternatives that could mitigate the impacts to the adjacent shorelines resulting from the past inlet dredging activities. Analysis includes studying the sediment budget at the inlet, sand bypassing at the inlet, the potential impact of the modified dredging on the efficiency of the natural bypassing at the inlet, and environmental impacts of the proposed dredging. The feasibility analysis will include preliminary design and pre-application meetings with the regulatory agencies. The management strategy listed below is based in part upon a 1993 inlet management study.

Strategy: Continue to bypass all beach compatible maintenance dredged sand to adjacent shoreline areas of greatest need meeting an average annual objective of 57,800 cubic yards; complete feasibility study; revalidate or refine the sediment budget contained in the study report.

LONGBOAT KEY, MANATEE COUNTY, R42-R67 THROUGH SARASOTA COUNTY, R1-R29

This is a 10.2 mile segment of critically eroded beach comprising the entire gulf shoreline of Longboat Key. The federal **Sarasota County Shore Protection Project** authorizes restoration of 2.4 miles of shoreline on Longboat Key in Manatee and Sarasota Counties. The Town of Longboat Key has elected not to pursue the federal shore protection project.

The project design for Longboat Key consists of a 50 foot wide beach berm at elevation +5 ft NGVD. Construction of 2.52 acres of artificial reef to mitigate for anticipated adverse impacts to nearshore hardbottom was required. Of the 2.52 acres of artificial reef planned, only 1 acre was constructed. To offset the impacts of the acreage that was not built, the Town of Longboat Key agreed to employ adaptive management and monitoring techniques designed to promote colonization of desired species on the existing artificial reef; the Town also agreed to construct the additional acreage at a later time.

In 1993, restoration of the Longboat Key segment (R46ME-R29ST) was completed using sand from the ebb shoals of Longboat Pass and New Pass. In 1997, nourishment of the central segment of the project

(R62ME-R14ST) was conducted using sand from an offshore borrow area. The project included sand-filled geotextile sills and groins installed at localized areas displaying accelerated erosion trends. In 1998, an extension of the terminal groin at the south end of the island was completed. In 2001, nourishment from R10.5 to R14 was conducted on Longboat Key. In 2003, maintenance dredging of New Pass was conducted with placement of 100,000 cubic yards of dredged material on Longboat Key between T22 to R28 in Sarasota County.

A Longboat Key nourishment was completed in the summer of 2006. The project was constructed to a berm elevation of +7.0 ft (NGVD) between T1 and R15 and between R24 and R26 in Sarasota County. The berm elevation for the remaining project fill area is +6 ft NGVD. The 2006 nourishment involved the placement of two distinct types of borrow material: (1) a coarser fill to be used as a base layer in areas of historically high erosion, and (2) a significantly finer lighter colored material (similar to native sand) to be used as a cap layer over the coarse base, and also used as a single fill layer in the remaining project fill areas. The local sponsor completed construction of 1.5 acres of artificial reef to mitigate for adverse impacts to nearshore hardbottom in July of 2006 fulfilling the mitigation requirements for the project.

Longboat Key Beach Restoration and Nourishment Events

| Date Completed | Volume | Sand Source | Location | Length |
|-----------------------|-----------------------|----------------------------------|-----------------|---------------|
| 1964 | 2,700 cubic yards | New Pass | No data | No data |
| 1982 | 93,000 cubic yards | New Pass | No data | No data |
| 1991 | 88,500 cubic yards | New Pass | No data | No data |
| August 1993 | 3,130,000 cubic yards | Longboat Pass and New Pass | R46ME-R29ST | 9.3 miles |
| 1996 | 148,000 cubic yards | New Pass | No data | No data |
| February 1997 | 891,000 cubic yards | Offshore of R-48 (Whitney Beach) | R62ME-R14ST | 3.1 miles |
| July 1997 | 109,000 cubic yards | Longboat Pass | R45 and R48-R51 | 1 miles |
| September 1997 | 171,000 cubic yards | New Pass | R25-R29 | 0.8 miles |
| May 2001 | 105,280 cubic yards | Offshore of R-48 (Whitney Beach) | R10.5-R14 | 0.7 miles |
| 2003 | 100,000 cubic yards | New Pass | T22-R28 | 1.1 miles |
| July 2006 | 1,500,000 cubic yards | Offshore | R44ME-R29.5ST | 9.8 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from bypassing and offshore sources; evaluate the performance of the existing sills and groins; evaluate the feasibility of erosion control structures in areas of accelerated erosion to retain beach fill.

NEW PASS, SARASOTA COUNTY, R29-R30

New Pass is a federal navigation project and provides access to the entrance of the turning basins at Payne Terminal and Sarasota's City Pier. Initial dredging of the authorized channel was completed in 1964. Maintenance dredging of the entrance channel has been conducted every three to five years. The dredged sand has been placed on the gulf shorelines of Longboat Key and Lido Key.

Strategy: Continue to bypass all beach compatible maintenance dredged sand to adjacent shoreline areas of greatest need.

LIDO KEY, SARASOTA COUNTY, R31-R44.5

This is a 2.4 mile segment of critically eroded beach along New Pass and the gulf shoreline of Lido Key. A 0.3 mile segment of critically eroded inlet shoreline is located on the north end of Lido Key fronting New Pass (1500 feet east of R31 - R31). Restoration has been conducted along the central gulf shoreline of the

island. The local sponsor is the City of Sarasota. The project design consists of a beach berm at elevation +5 ft NGVD and provides five years of advance nourishment to protect the existing dune and upland development.

In 1970, the City of Sarasota conducted restoration along Coolidge Park (R35-R38.4). The beach has been nourished with sand from maintenance dredging of the New Pass navigation channel. In 1998, nourishment was conducted (R35-R40) using sand from an offshore borrow area. In 2001 and 2003, nourishment was conducted (R36.5-R44.2). An offshore sand source was utilized for both these events.

In 2002, the U.S. Army Corps of Engineers completed a feasibility study. Recommendations from the study include restoration of 8,280 feet of shoreline from R-35 to R-43 with 460,200 cubic yards of design fill and 614,500 cubic yards of advance fill for a total of 1,074,700 cubic yards. The Corps identified three offshore borrow areas for the 50-year life of the project. The feasibility study also recommends the construction of three groins varying in length from 320 to 650 feet along the southern portion of the study area with the northernmost groin at approximately R42.5 and the southern groin at the southern tip of Lido Key.

In response to the 2004 hurricane season, nourishment of the federal **Lido Key Shore Protection Project** was accelerated, with construction expected to begin in 2008.

Lido Key Shore Protection Project

| Date Completed | Volume | Sand Source | Location | Length |
|-----------------------|---------------------|--------------------|-----------------|---------------|
| 1964 | 121,000 cubic yards | New Pass | R35-R38.5 | 0.6 miles |
| 1970 | 350,000 cubic yards | New Pass | R35-R38.5 | 0.6 miles |
| June 1974 | 246,000 cubic yards | New Pass | R35-R38 | 0.5 miles |
| October 1977 | 400,000 cubic yards | New Pass | R35-R38 | 0.5 miles |
| 1982 | 92,000 cubic yards | New Pass | R35-R38 | 0.5 miles |
| 1985 | 239,000 cubic yards | New Pass | R35-R38 | 0.5 miles |
| 1991 | 177,000 cubic yards | New Pass | R34.5-R38 | 0.6 miles |
| 1996 | 178,000 cubic yards | New Pass | R34.5-R38 | 0.6 miles |
| May 1998 | 285,000 cubic yards | Offshore | R35-R40 | 0.8 miles |
| April 2001 | 360,000 cubic yards | Offshore | R36.5-R44.2 | 1.4 miles |
| February 2003 | 125,000 cubic yards | New Pass | R35.5-R43.2 | 1.4 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from bypassing and offshore sources; restoration of the remaining critically eroded beach along the southern gulf shoreline of the island; conduct feasibility study for alternative beach erosion control terminal structures at south end of island.

BIG SARASOTA PASS, SARASOTA COUNTY, R44-R45

Big Sarasota Pass has not been improved or dredged for navigation.

Strategy: Monitor.

SIESTA KEY, SARASOTA COUNTY, R44A-R45

This is a 0.8 mile segment of critically eroded inlet shoreline on the north shore of Siesta Key adjacent to Big Sarasota Pass. Threatened private development along this segment of shoreline has been armored with bulkheads and rock revetments. The northern shoreline of Siesta Key, fronting on the pass, has been substantially armored

Strategy: Monitor.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Manatee County, Sarasota County, City of Anna Maria, City of Holmes Beach, City of Bradenton Beach, Town of Longboat Key, City of Sarasota, the West Coast Inland Navigation District, and the U.S. Army Corps of Engineers, all of which participate as sponsors of beach management projects. Project cost and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include refining the existing sediment management strategy that uses beach quality sand from the maintenance dredging of Longboat Pass and New Pass for maintenance of the beach restoration projects on Longboat Key and Lido Key.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, colonial shorebirds, manatees and hardbottom/reef habitat are primary environmental concerns within this subregion. The timing of construction activities has been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid and minimize adverse impacts to the listed species and their habitat. The Lido Key beach nourishment site is adjacent to the Sarasota Bay Estuarine System (Outstanding Florida Waters), which extends into Big Sarasota Pass, and portions of New Pass are also located within the Sarasota Bay Estuarine System.

SAND SOURCES

Potential offshore borrow areas have been identified during design of restoration projects; however, these sand sources are not adequate to meet the needs of projects in this subregion over the next 15 years. A regional sand search and inventory should be performed to locate and characterize beach compatible sand. A study should be conducted to investigate the impact of the Passage Key borrow areas on the surrounding ebb shoal complex.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

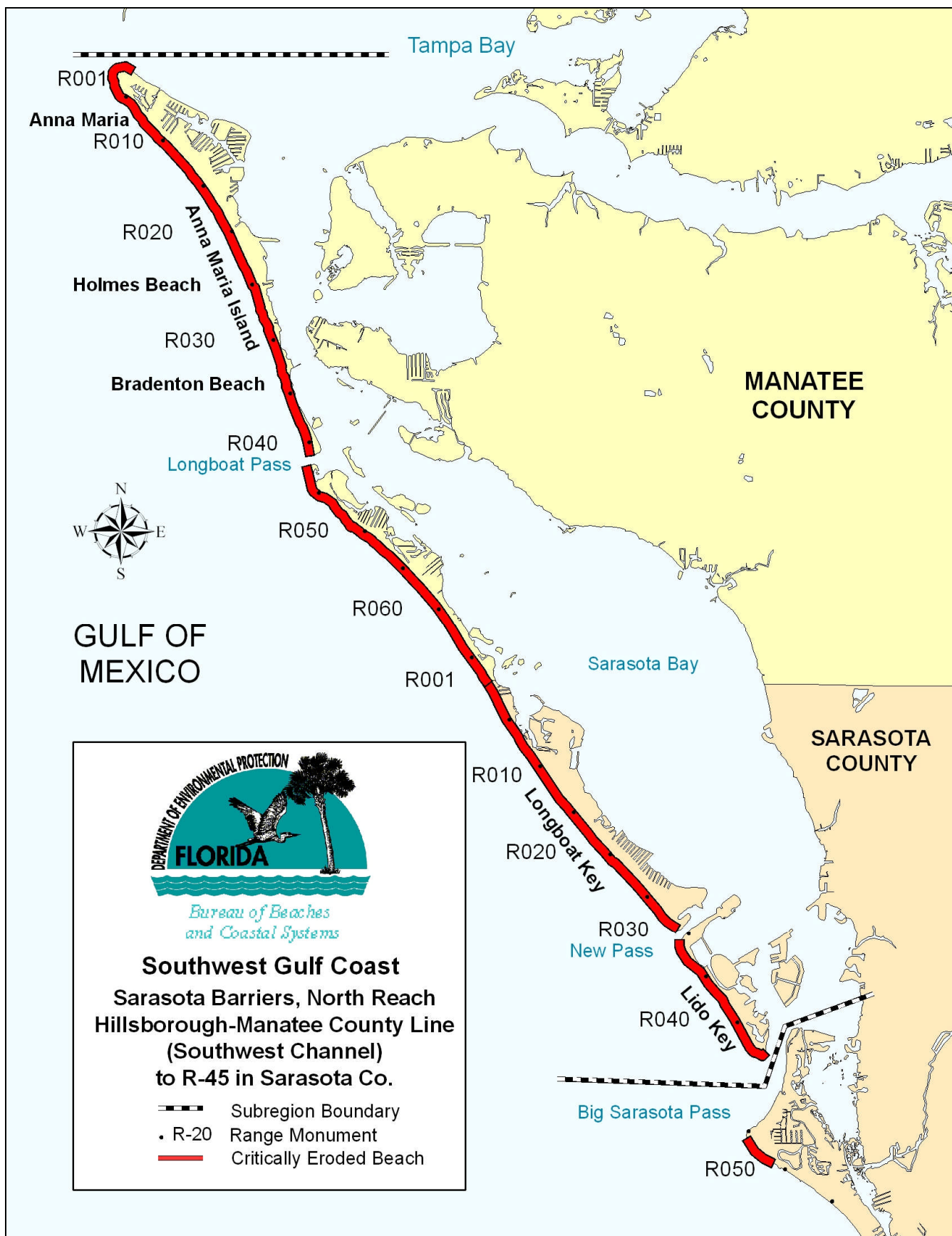


Figure SW.2: Sarasota Barriers North Reach

REFERENCES

- Applied Technology and Management, Inc., 1993. Longboat Pass Inlet Management Plan.
- Clark, R.R., 1982. Coastal Damage Associated with Subtropical Storm, June 18, 1982, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.
- Clark, R.R., 1986. The Impact of Hurricane Elena and Tropical Storm Juan on Coastal Construction in Florida, Florida Department of Natural Resources, Bureau of Coastal Engineering and Regulation, Beaches and Shores Post-storm Report No. 85-3, 144 p.
- Coastal Planning & Engineering, Inc., 1995. Cultural Resources Investigation and Remote Sensing Magnetometer Survey Results for Two Proposed Offshore Sand Borrow Sites at Lido Key, Florida..
- Coastal Planning & Engineering, Inc., 1993b. New Pass Inlet Management Plan.
- Coastal Planning & Engineering, Inc., 1993a. draft Big Sarasota Pass Inlet Management Plan.
- Coastal Planning & Engineering, Inc., 1992. Lido Key Beach Restoration Project Sand Search.
- Coastal Technology Corporation, 2003. Sarasota/Charlotte County Beach Restoration Study.
- Florida Department of Environmental Protection. 2004 *Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.
- Florida Department of Environmental Protection, 2007. Critically Eroded Beaches in Florida, Bureau of Beaches and Coastal Systems, June 2007.
- Foster, E.R., and Savage, R.J., 1989. Historical Shoreline Changes in Southwest Florida, Proceedings of Coastal Zone '89, American Society of Civil Engineers, pp. 4420-4433.
- U.S. Army Corps of Engineers, 2002. Sarasota County, Florida Hurricane and Storm Damage Reduction Project: Lido Key, Feasibility Report with Draft Environmental Assessment, 701p.
- U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.
- U.S. Army Corps of Engineers, 1995. *Maintenance Dredging and Placement: Longboat Pass Manatee County, Florida, Environmental Assessment*, 23p.
- U.S. Army Corps of Engineers, revised 1991. *Manatee County, Florida, Shore Protection Project, General Design Memorandum with Supplemental Environmental Impact Statement*.
- U.S. Army Corps of Engineers, 1984. *Beach Erosion Control Study for Sarasota County, Florida, with Environmental Impact Statement*.

SARASOTA BARRIERS SOUTH REACH

There are 18.9 miles of beaches in the Sarasota Barriers South Reach subregion, which extends from Sarasota Point (R45) on the northwest end of Siesta Key to the north end of Manasota Key (R143) in Sarasota County, as shown on Figure SW.3. There are 10.8 miles of critically eroded beaches in this subregion, of which 5.4 miles have been restored.

Erosion is attributed to winter frontal systems, tropical storms and hurricanes, and the effects of Venice Inlet. The most erosive storms in recent years were Hurricane Agnes (1972), the Subtropical Storm of June 1974, the Subtropical Storm of June 1982, Hurricane Elena (1985), Tropical Storm Juan (1985), Tropical Storm Josephine (1996), and Hurricanes Frances and Jeanne (2004).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

COUNTYWIDE STUDIES AND PROJECTS

In 2003, the Sarasota and Charlotte County Beach Restoration Study was completed. The purpose of the study was to investigate the extent and nature of Gulf shoreline erosion and examine the technical, regulatory and financial feasibility of large-scale erosion control actions for consideration in the development of the Strategic Beach Management Plan. The study area included all of the unincorporated shoreline of Sarasota County and Charlotte County to Gasparilla Pass. The Town of Longboat Key, the City of Sarasota, the City of Venice and Gasparilla Island were excluded because they have pursued their own studies and erosion control projects. The study area totals more than 32 miles of shoreline and represents an effort by the State to address these issues on a regional basis.

NORTH SHORE OF SIESTA KEY, SARASOTA COUNTY, R46-R48.4

This is a 0.4 mile segment of critically eroded beach on the northern gulf shore of Siesta Key immediately south of Sarasota Point. This area is contiguous with a 0.8 mile segment of critically eroded inlet shoreline on the north shore of Siesta Key adjacent to Big Sarasota Pass. The area has been armored with rock revetments. A feasibility study was conducted for Sarasota and Charlotte Counties; this study recommended beach nourishment with structures. At this time, the local sponsor has decided not to proceed with projects in this critically eroded area.

Strategy: Monitor.

SOUTH SIESTA KEY, SARASOTA COUNTY, R64-R77

This is a 2.4 mile segment of critically eroded beach on the southern gulf shore of Siesta Key, south of Point O' Rocks. In March of 2007, Sarasota County completed construction of the **South Siesta Key Beach Restoration Project** (R67-R77) placing approximately 850,000 cubic yards of sand from offshore borrow sites. The project design consists of a beach berm at elevation +7 ft NGVD tapering to elevation +6 ft NGVD and provides ten years of advance beach nourishment to protect the existing dune and upland development.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources.

CASEY KEY, SARASOTA COUNTY R81-R96

This is a 2.9 mile segment of critically eroded beach on the northern gulf shore of Casey Key. The area has been extensively armored with rock revetments. A feasibility study was conducted and recommended beach restoration.

Strategy: Conduct beach restoration

VENICE INLET, SARASOTA COUNTY, R114-R115

Venice Inlet (also known as Casey's Pass) is part of the federal Intracoastal Waterway Navigation Project. From 1937 to 1938, the U.S. Army Corps of Engineers stabilized Venice Inlet by constructing two jetties that extended approximately 500 feet into the Gulf of Mexico. In 1940, the revetment along the south beach was extended from 930 to 988 feet. Repairs to the jetties were made in 1949 and 1955. Small volumes of maintenance dredged material have been removed on an infrequent basis from the inlet channel since navigation improvements were constructed in 1938.

The Department adopted the Venice Inlet Management Study Implementation Plan in September 1998 that specifies the placement of beach compatible maintenance dredged material or offshore material on downdrift beaches. The combined total of material from all sources shall equal or exceed 64,620 cubic yards on an average annual basis. A feasibility study recommended that the ebb shoal not be used as a sand source. A study of the feasibility of using the flood shoal as a sand source and developing a sediment impoundment basin is currently underway.

Strategy: Place all beach compatible maintenance dredged material on the downdrift beaches in areas of greatest need; supplement dredged material with sand from offshore borrow areas; the combined bypassing total from all sources shall equal or exceed 64,620 cubic yards on an average annual basis; revalidate or refine the sediment budget.

VENICE, SARASOTA COUNTY, R116-R143

This is a 5.1 mile segment of critically eroded beach on the downdrift shore south of Venice Inlet. The Venice segment of the federal **Sarasota County Shore Protection Project** authorizes restoration of 5.6 miles of shoreline. A restoration project was constructed along 3.2 miles of shoreline at Venice (R116-R133) south of the inlet in two phases (between August 1994 and May 1996) using approximately 1,800,000 cubic yards of sand from borrow areas offshore of Manasota Key. In November 1997, a total of 3.14 acres of mitigative artificial reef were constructed offshore of R130 to mitigate for adverse impacts to nearshore hardbottom.

In August 2005, the City of Venice completed nourishment of the **City of Venice Beach Nourishment Project** (R116-R133) using 900,000 cubic yards of sand from five offshore borrow sites. The project design consists of a beach berm at elevation +9 ft NGVD to protect the existing dune and upland development. Environmental monitoring of the restoration project indicated additional coverage of nearshore hardbottom which was not mitigated by the 3.14 acres of artificial reef constructed in conjunction with the restoration project. The City of Venice will construct an additional 7.3 acres of artificial reef to compensate for these impacts. The nourishment project also includes maintenance and extension of existing stormwater outfall pipes along the project area shoreline.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources; where practicable, redirect stormwater discharges away from the beach and dune system to upland storage, retention, and treatment sites; restore remaining critically eroded area.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Sarasota County, City of Venice, West Coast Inland Navigation District, and the U.S. Army Corps of Engineers, which participate with the Department as sponsors of beach management projects. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include implementing beach erosion control projects for critically eroded beaches on Casey Key and restoring the remaining critically eroded shoreline in the Venice segment.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, shorebirds, manatees and hardbottom/reef habitat are primary environmental concerns within this subregion. The timing of construction activities has been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. The Gulf Intracoastal Waterway in the vicinity of Venice Inlet is located within the Sarasota Bay Estuarine System, an Outstanding Florida Water where more stringent water quality standards apply.

SAND SOURCES

Potential borrow areas have been identified during design of beach restoration; however, these sand sources are not adequate to meet the needs of projects in this subregion over the next 15 years. Sand searches should be conducted to identify future sources of sand for projects. A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation projects should be incorporated into the maintenance of the beach restoration projects.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

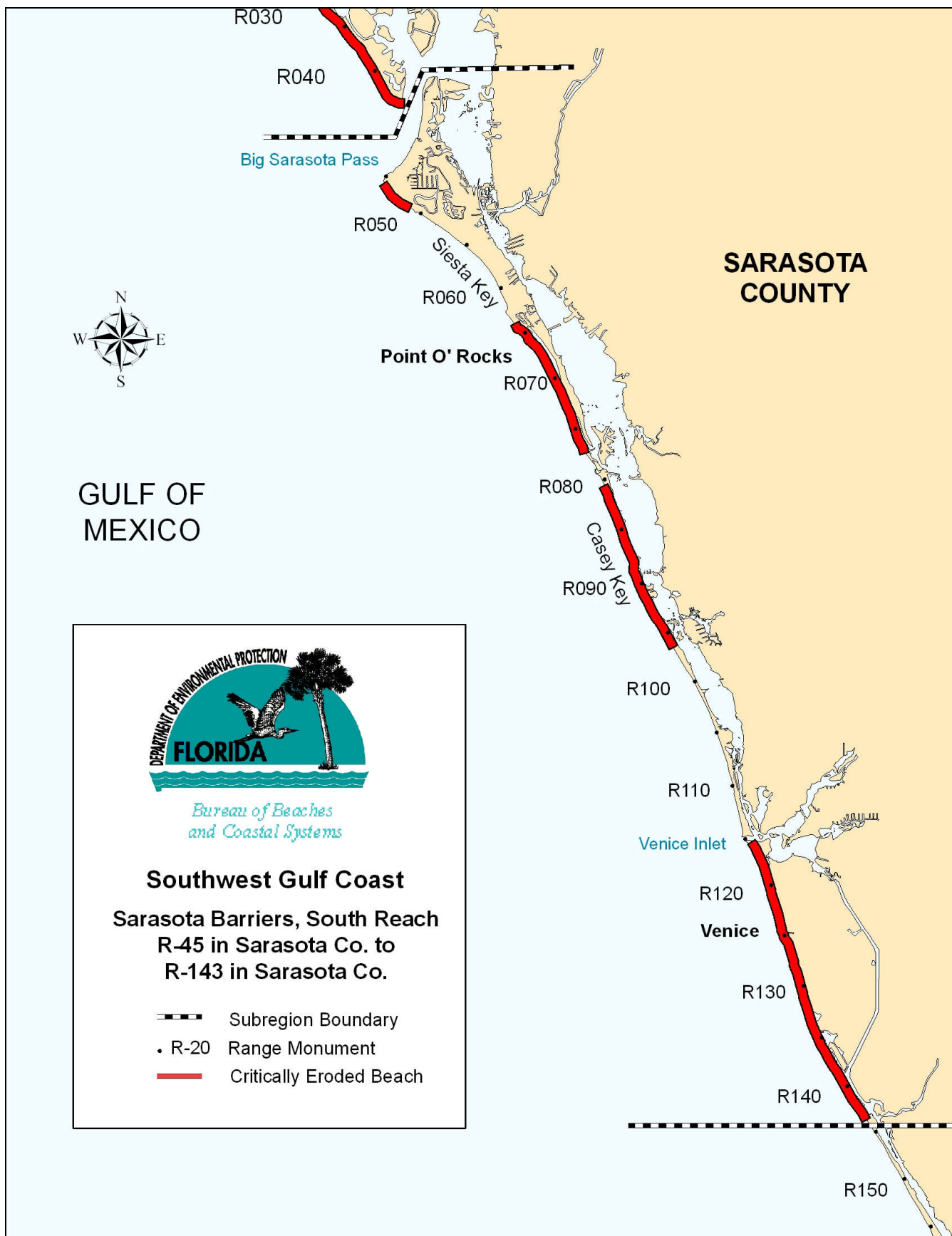


Figure SW.3: Sarasota Barriers South Reach

REFERENCES

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.

Clark, R.R., 1986. *The Impact of Hurricane Elena and Tropical Storm Juan on Coastal Construction in Florida*, Florida Department of Natural Resources, Bureau of Coastal Engineering and Regulation, Beaches and Shores Post-storm Report No. 85-3, 144 p.

Coastal Planning & Engineering, Inc., 1994. *Venice Inlet Management Plan*.

Coastal Technology Corporation, 2003. *Sarasota/Charlotte County Beach Restoration Study*.

Florida Department of Environmental Protection. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, June 2007.

Florida Department of Environmental Protection, 2004. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection, 1998. *Venice Inlet Study Management Study Implementation Plan*.

Foster, E.R., and Savage, R.J., 1989. *Historical Shoreline Changes in Southwest Florida*, Proceedings of Coastal Zone '89, American Society of Civil Engineers, pp. 4420-4433.

Taylor Engineering Inc., 2002. *Sand Source Investigation Venice, Sarasota County, Florida, Final Report*.

Sarasota County, 2002. *Island of Venice Basin Master Plan Update*.

U.S. Army Corps of Engineers, 1984. *Beach Erosion Control Study for Sarasota County, Florida, with Environmental Impact Statement*.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.

U.S. Army Corps of Engineers, 1997. *Environmental Assessment for Maintenance Dredging of Venice Inlet Sarasota County, Florida*, Lotspeich and Associates, Inc., 15p.

MANASOTA BARRIERS

There are 18.9 miles of beaches in the **Manasota Barriers** subregion, which extends from the north end of Manasota Key (R143) in Sarasota County to Gasparilla Pass (R60) in Charlotte County, as shown on Figure SW.4. There are a total of 7.8 miles of critically eroded beaches in this subregion (2.9 miles in Sarasota County and 4.9 miles in Charlotte County), of which 2.55 miles have been restored.

Erosion is attributed to winter frontal systems, tropical weather systems in the Gulf, and the effects of the inlets which include Stump Pass and Gasparilla Pass. The most erosive storms in recent years were Hurricane Agnes (1972), the Subtropical Storm of June 1974, the Subtropical Storm of June 1982, Tropical Storm Bob and Hurricane Elena (1985), Tropical Storm Juan (1985), Tropical Storm Keith (1988), Tropical Storm Josephine (1996), and Tropical Storm Gabrielle (2001).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

COUNTYWIDE STUDIES AND PROJECTS

In 2003, the Sarasota and Charlotte County Beach Restoration Study was completed. The purpose of the study was to investigate the extent and nature of Gulf shoreline erosion and examine the technical, regulatory and financial feasibility of large-scale erosion control actions for consideration in the development of the Strategic Beach Management Plan. The study area included all of the unincorporated shoreline of Sarasota County and Charlotte County to Gasparilla Pass. The Town of Longboat Key, the City of Sarasota, the City of Venice and Gasparilla Island were excluded because they have pursued their own studies and erosion control projects. The study area totals more than 32 miles of shoreline and represents an effort by the State to address these issues on a regional basis.

MANASOTA KEY, SARASOTA COUNTY, R168 - R183 AND CHARLOTTE COUNTY, R1-R17

This is an approximately 5.6 mile long segment (2.9 miles in Sarasota County and 2.7 miles in Charlotte County) of critically eroded beach on Manasota Key that includes Englewood Beach and the Stump Pass Beach State Park. In July 2003, 100,000 cubic yards of sand was placed on 0.5 miles of Manasota Key beaches (R14.5 to R17). Sand sources for the 2003 placement event included material dredged from the realignment of Stump Pass and the Stump Pass ebb shoal. Maintenance dredging of Stump Pass completed in June of 2006 placed approximately 148,000 cubic yards of sand over 0.75 miles of beach from R14 to R18. An experimental submerged groin system was installed in 2005 and 2006 as described below. It was ordered removed in 2008.

Strategy: Maintain sand placed on Stump Pass Beach State Park to mitigate for inlet maintenance impacts; restore critically eroded beaches; remove the submerged groin structures.

STUMP PASS, CHARLOTTE COUNTY, R21-R22

Stump Pass was a natural inlet until a navigation channel was dredged in 1980. The dredged material was placed on the beach north of the pass within the Stump Pass Beach State Park. In 1998, dredging of a small interim navigation channel through the natural ebb channel was conducted pending implementation of an inlet management and navigation plan. The 175,000 cubic yards of dredged material were placed on the Knight Island shoreline adjacent to the pass and the gulf shoreline beginning approximately one mile south of Stump Pass. In 2003, a joint beach nourishment and navigation project was implemented and the Stump Pass channel was realigned. Maintenance dredging of the channel was last completed in June of 2006 with a total of 453,000 cubic yards of dredged material placed on Manasota Key, Knight and Don Pedro Islands. Coastal structures to stabilize the inlet have not been constructed.

Strategy: Place available beach compatible maintenance dredged material on the updrift and downdrift shorelines; investigate the feasibility of a terminal groin to stabilize the south end of Manasota Key; monitor.

KNIGHT ISLAND AND BOCILLA ISLAND, CHARLOTTE COUNTY, R28-R39

This is a 1.8 mile segment of critically eroded beach on the merged segment of Knight Island and Bocilla Island that includes the former Bocilla Pass. In 1995, the **Charlotte County Beach Restoration Project** was completed along the northern gulf shoreline of Knight Island (R27.5-R30) by Charlotte County. In 1998, dredged material from the interim navigation channel at Stump Pass was placed below the mean high water contour along the southern portion of the beach restoration project area. Dredging during the Stump Pass realignment in 2003 placed sand in this critically eroded area. Maintenance dredging of Stump Pass in 2006 placed material on these critically eroded beaches. Future maintenance dredging of Stump Pass calls for placement of dredged material along adjacent shorelines to the north and south.

Charlotte County Beach Restoration

| Date Completed | Volume | Sand Source | Location | Length |
|-----------------------|---------------------|---|--|---------------|
| January 1995 | 255,000 cubic yards | southern lobe of the Stump Pass ebb tidal shoal | R27.5-R30 | 0.6 miles |
| 1998 | 89,000 cubic yards | dredging of the Stump Pass interim navigation channel through the natural ebb channel | R29-R39 (below the mean high water contour) | 1.8 miles |
| June 2003 | 628,000 cubic yards | Stump Pass realignment | R29-R40 | 2 miles |
| June 2006 | 298,200 cubic yards | Stump Pass | R29-R40 | 2 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from bypassing and offshore sources; monitor.

LITTLE GASPARILLA ISLAND, CHARLOTTE COUNTY, R47.5-R49.5

This is a 0.4 mile segment of critically eroded beach on Little Gasparilla Island south of the former Little Gasparilla Pass. This area eroded due to the effects of the former Little Gasparilla Pass, but may now be returning to stability.

Strategy: Monitor.

GASPARILLA PASS, CHARLOTTE COUNTY, R57-R59

Gasparilla Pass is an unimproved inlet.

Strategy: Monitor.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Sarasota County, Charlotte County, West Coast Inland Navigation District, Florida Parks Service, and the U.S. Army Corps of Engineers, all of which participate

with the Department as sponsors of beach management projects. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. At this time, the only opportunity for project coordination that has been identified in this subregion is the placement of beach compatible sand from Stump Pass on adjacent critically eroded beaches.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, shorebirds, manatees, both hardbottom and reef habitat, and seagrass beds are environmental concerns within this subregion. The timing of construction activities has been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. Stump Pass in the vicinity of Lemon Bay is located in a shellfish harvesting area and the Lemon Bay Aquatic Preserve, Outstanding Florida Waters. Projects located within and near the aquatic preserve boundaries require additional protection, including stricter water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.

SAND SOURCES

Sufficient sand sources for beach nourishment over the next 15 years have not been identified. A regional sand search and inventory should be performed to locate and characterize beach compatible sand. A regional sediment management strategy that uses beach quality sand maintenance dredged from the navigation projects should be incorporated into the maintenance of the beach nourishment projects.

INNOVATIVE TECHNOLOGIES

During the summer of 2005 and then in the spring of 2006, an experimental submerged geotextile groin field consisting of six low-profile geotextile groins was installed below mean high water between R19 and R21 in Stump Pass Beach State Park in Charlotte County. The installation could not be completed entirely during the summer of 2005 and was completed in 2006. The stated purpose of the groin field was to reduce the southerly drift of littoral material that re-enters Stump Pass. The project was evaluated on its ability to retain material placed on the Park shoreline and reduce infilling in the Pass, thereby reducing the frequency of maintenance dredging. The third party review of the innovative project determined that the project was causing additional erosion to park shoreline and recommended removal.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

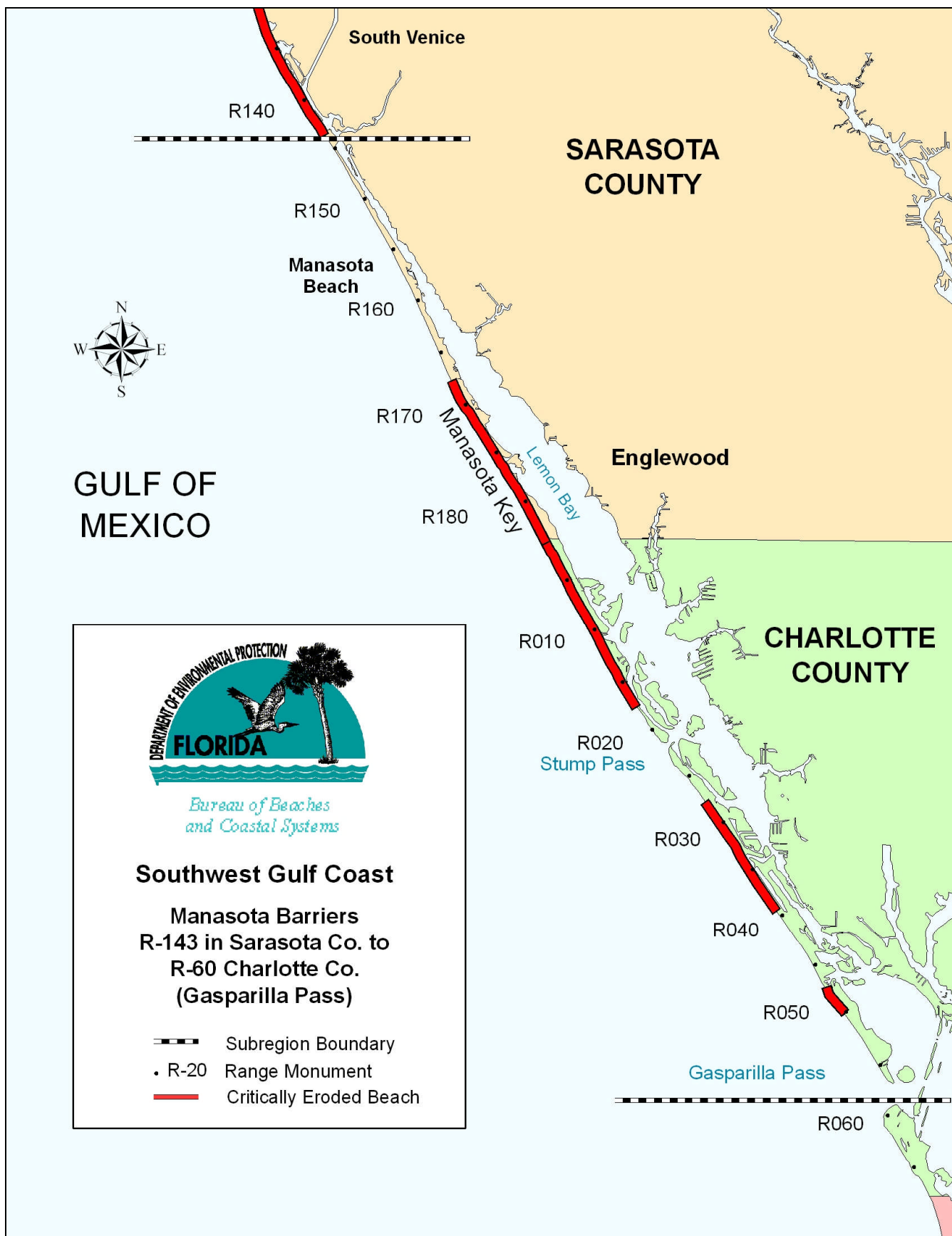


Figure SW.4: Manasota Barriers

REFERENCES

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.

Clark, R.R., 1986. *The Impact of Hurricane Elena and Tropical Storm Juan on Coastal Construction in Florida*, Florida Department of Natural Resources, Bureau of Coastal Engineering and Regulation, Beaches and Shores Post-storm Report No. 85-3, 144 p.

Florida Department of Environmental Protection. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, June 2007.

Florida Department of Environmental Protection. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Coastal Engineering Consultants, Inc., 1991. *Stump Pass Inlet Management Plan*.

Coastal Technology Corporation, 2003. *Sarasota/Charlotte County Beach Restoration Study*.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.

CHARLOTTE HARBOR COMPLEX

There are 36.8 miles of beaches in the **Charlotte Harbor Complex** subregion, which extends from Gasparilla Pass (R60) in Charlotte County to the San Carlos Bay Entrance (R174) in Lee County, as shown on Figure SW.5. There are 13.4 miles of critically eroded beaches in this subregion, of which 10.35 have been restored.

Erosion is attributed to winter frontal systems, tropical weather systems in the Gulf, and the effects of inlets including Boca Grande Pass, Captiva Pass, Redfish Pass, and Blind Pass. The most erosive storms in recent years were Hurricane Agnes (1972), the Subtropical Storm of June 1974, the Subtropical Storm of June 1982, Tropical Storm Bob (1985), Hurricane Elena (1985), Tropical Storm Juan (1985), Tropical Storm Keith (1988), Tropical Storm Gabrielle (2001), and Hurricane Charley (2004).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

GASPARILLA ISLAND, LEE COUNTY, R7-R26.7

This is a 4.0 mile segment of critically eroded beach along the southern gulf shore of Gasparilla Island including portions of Gasparilla Island State Park (R22.5 - R26A). Sand from the maintenance dredging of Boca Grande Pass has been placed along the southern portion of this area. The federal **Lee County Shore Protection Project** authorizes restoration and associated shore protection structures, as needed, for eroding beaches on Gasparilla Island, Captiva Island and Estero Island. The local sponsor for the Gasparilla portion of the federal project is Lee County.

In 1999, the U.S. Army Corps of Engineers completed a General Reevaluation Report (GRR) for Gasparilla and Estero Islands. The recommended project for the two islands was later modified. The modified project provides for restoration of 2.8 miles of shoreline on Gasparilla Island (R11-R24). A terminal groin at the south end of the island adjacent to Boca Grande Pass was considered uneconomical and not recommended. In January 2000, the Department and Lee County initiated engineering design and permitting to construct the project on a reimbursement basis with the federal government. The final design included a segmented breakwater located approximately 325 feet offshore of R25; two T-head groins in the vicinity of R26; and restoration from R10 to R26 using approximately 920,000 cubic yards of sand from an offshore borrow area. The restoration project was completed in April of 2007 and the design consists of a beach berm at elevation +5 ft NGVD sloping to +4.2 ft NGVD to protect the existing dune and upland development. The structures are scheduled for construction in 2010. The project includes construction of 0.9 acres of artificial reef offshore of R11 to mitigate for adverse impacts to nearshore hardbottom.

In 2004, construction was completed on a toe scour rock revetment (design elevation of +4 ft NGVD) constructed along 791 linear feet of the Belcher Road seawall between R24.5 and R25.5. This revetment provides protection to Gasparilla Island State Park infrastructure including roadway. The restoration project completely buried the rock revetment.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources; construct the erosion control structures; monitor.

BOCA GRANDE PASS NORTH SHORE, LEE COUNTY, 1000 FEET EAST OF R26.7

This is a 0.2 mile segment of critically eroded inlet shoreline where Gasparilla Island State Park buildings are threatened.

Strategy: Conduct beach restoration project; if not economically viable, consider armoring or landward relocation of the threatened structures.

BOCA GRANDE PASS, LEE COUNTY, R26-R27

Boca Grande Pass is a part of the federal **Charlotte Harbor Navigation Project**. Initial dredging of the authorized channel was completed in 1912. Maintenance dredging of the entrance channel has been conducted every two to three years since 1971. The dredged sand has been placed offshore, except in 1981, 1993, and 1997, when it was placed on the adjacent gulf shoreline of Gasparilla Island. In 1991, the U.S. Army Corps of Engineers completed a study that recommended that maintenance dredged material from the Charlotte Harbor navigation project be placed on the gulf shoreline of Gasparilla Island to provide storm protection and recreational benefits. However, future maintenance dredging requirements are uncertain due to closure of a local oil shipping terminal which previously necessitated the maintenance dredging.

Strategy: Place beach compatible sand from maintenance dredging on the shoreline of Gasparilla Island in conjunction with the restoration project.

CAPTIVA PASS, LEE COUNTY, R65-R66

This is an unimproved, natural pass between Cayo Costa Island and North Captiva Island.

Strategy: Monitor.

NORTHERN SHORE OF NORTH CAPTIVA ISLAND, LEE COUNTY, R66-R71

This is a 1.0 mile segment of critically eroded beach on the northern shore of North Captiva Island, including 1,000 feet of inlet shoreline east of R66 (0.2 miles) adjacent to Captiva Pass. This area is expected to undergo periods of accretion and erosion as a result of the changes to the inlet channel and the ebb shoal.

Strategy: Monitor.

SOUTHERN SHORE OF NORTH CAPTIVA ISLAND, LEE COUNTY, R79-R82.3

This is a 0.8 mile segment of critically eroded beach on the southern gulf shore of North Captiva Island adjacent to Redfish Pass. Shore protection structures were constructed on the property at the south terminus of the island in 1998. During Hurricane Charley in 2004, the segment of beach from R78 to R79 was breached forming an opening, locally known as Charley's Cut. Charley's Cut remains open but has decreased in size since its initial opening.

Strategy: Monitor in conjunction with the monitoring program for Redfish Pass and evaluate performance of existing shore protection structures and additional erosion control alternatives.

REDFISH PASS, LEE COUNTY, R82-R83

Redfish Pass, a natural inlet formed in 1921, provides recreational boating access through a relatively deep channel that has not required maintenance dredging. In 1977, construction began on a terminal groin at the north end of Captiva Island adjacent to Redfish Pass, which was completed in 1981. In 1981, 1988 and 1989, the ebb shoal was used as a sand source for beach nourishment of Captiva Island. In 1993, an inlet

management study was sponsored by Captiva Erosion Prevention District (CEPD). In 1998, T-head groins were constructed by private interests on the south end of North Captiva Island, as recommended in the study. During the summer of 2006, the terminal groin on Captiva Island adjacent to Redfish Pass was extended 100 feet seaward and refurbished in conjunction with the Captiva-Sanibel Beach Nourishment Project.

Strategy: Implement a comprehensive beach, inlet and offshore monitoring program to validate or redefine the sediment budget developed in the inlet management study.

CAPTIVA ISLAND, LEE COUNTY, R83-R109

This is a 5.0 mile segment of critically eroded beach that includes the entire gulf shoreline of Captiva Island and a 0.2-mile segment of inlet shoreline adjacent to Redfish Pass. Beach restoration and nourishment have been conducted and terminal groins have been constructed at each end of the project area. In 1981, restoration was conducted along the northern portion of the Captiva Island (R84-R109) segment of the **Lee County Shore Protection Project** without federal participation. In 1988 and 1989, nourishment of this area and restoration of the remainder of Captiva Island was completed on a federal reimbursement basis. In 1996, nourishment of Captiva Island and the northern gulf shoreline of Sanibel Island (R110-R114) was completed using sand from an offshore borrow area. Nourishment of Captiva Island (R85-R109) in conjunction with nourishment of the northern shoreline of Sanibel Island (R110-R118) was completed in January of 2006.

Captiva Beach Restoration Project

| Date Completed | Volume | Location | Length |
|-----------------------|-----------------------|-----------------|---------------|
| October 1981 | 655,500 cubic yards | R84-R109 | 5.0 miles |
| April 1989 | 1,595,000 cubic yards | R85-R109 | 4.8 miles |
| April 1996 | 817,300 cubic yards | R84-R109 | 5.0 miles |
| January 2006 | 1,000,000 cubic yards | R85-R109 | 4.8 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources; monitor.

BLIND PASS, LEE COUNTY, R109

In 1972, a terminal groin was constructed at the south end of Captiva Island to protect the bridge across Blind Pass. In 1989, the groin was extended to stabilize the restoration project at the south end of the island. Blind Pass is a historic natural inlet, but shoaling has frequently closed the pass since the opening of Redfish Pass. In 1993, the Department and Captiva Erosion Prevention District sponsored an inlet management study. Since 2000, Blind Pass has primarily remained closed. In March of 2001, the portion of Blind Pass seaward of the bridge was mechanically dredged. In 2004, Blind Pass opened briefly during Hurricane Charley. CEPD has designed and obtained a permit to open the pass and place beach compatible sand on the downdrift beach..

Strategy: Bypass 37,250 cubic yards of beach compatible sand to the downdrift shoreline south of the inlet on an annual average basis; implement a comprehensive beach, inlet and offshore monitoring program to validate or redefine the sediment budget.

NORTHERN SHORE OF SANIBEL ISLAND, LEE COUNTY, R109-R118

This is a 1.7 mile segment of critically eroded beach on the northern gulf shore of Sanibel Island. In 1996, restoration of the northern gulf shoreline of Sanibel Island (R110-R114) was conducted in conjunction with nourishment of Captiva Island. Nourishment was completed in January of 2006 (R110-R118)

| Sanibel Island Beach Restoration Project | | | |
|---|---------------------|---|---------------|
| Date Completed | Volume | Location | Length |
| April 1996 | 237,100 cubic yards | R110.5-R114 | 0.74 miles |
| January 2006 | 305,000 cubic yards | R110-R116 (excluding a 900 foot gap at Clam Bayou and R116 to R118) | 1.6 miles |

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassing sources.

GULF PINES SUBDIVISION, SANIBEL ISLAND, LEE COUNTY, R129-R133

This is a 0.9 mile segment of critically eroded beach on the central gulf shore of Sanibel Island at Gulf Pines subdivision. Concurrently with the Sanibel Restoration Project in 1996, but under a separate contract with the dredging contractor, the City of Sanibel constructed a restoration project along the Gulf Pines (R129-R133) segment of the island placing 229,000 cubic yards of sand from an offshore borrow area.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Charlotte County, Lee County, Captiva Erosion Prevention District, City of Sanibel, West Coast Inland Navigation District, and the U.S. Army Corps of Engineers, all of which participate with the Department as sponsors of beach management projects. The island of Cayo Costa and a number of properties on Gasparilla and North Captiva Island are managed by the Department's Division of Recreation and Parks. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include future construction of Estero Island segment of the federal shore protection project under a single contract with nourishment projects in the subregion if the same type of dredge vessel can be used.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, shorebirds, manatees and hardbottom and reef habitat are primary environmental concerns within this subregion. The timing of construction activities has not been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of

construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. The Gasparilla Sound - Charlotte Harbor Aquatic Preserve boundary is located in the vicinity of south Gasparilla Island and Boca Grande Pass. Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the natural conditions.

SANDSOURCES

Sand sources to meet the needs of future projects in this subregion over the next 15 years have been identified.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

REFERENCES

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.

Clark, R.R. and LaGrone, J.W., 2004. *Hurricane Charley: Post-storm Beach Conditions and Coastal Impact Report with Recommendations for Recovery and Modifications of Beach Management Strategies*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, 34 pp.

City of Sanibel and Humiston & Moore Engineers, P.A., 1995. *Sanibel Island-Wide Beach Management Plan*.

Coastal Planning & Engineering, Inc., 1993. *Blind Pass Inlet Management Plan*.

Coastal Planning & Engineering, Inc., 1993. *Redfish Pass Inlet Management Plan*.

Erickson Consulting Engineers, 2006. *Design Report: Blind Pass*.

Florida Department of Environmental Protection. 2004 *Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection, 2007. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, June 2007.

Moore, B.D., 1999. *T-groin Design and Performance as an Erosion Control Alternative at Two Florida Gulf Coast Inlets*, Proceedings of the 12th Annual National Conference on Beach Preservation Technology, pp. 187-203.

Tackney and Associates, Inc., 1983. *Physical Monitoring Captiva Beach Restoration Project: Six Month Monitoring Report*, 39p.

U.S. Army Corps of Engineers, 2000 (revised 2001). *Lee County, Florida, Shore Protection Project (Gasparilla and Estero Islands), General Reevaluation Report with Environmental Impact Statement*.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.

U.S. Army Corps of Engineers, 1990 (revised 1991). *Charlotte Harbor, Lee County, Florida, Section 933 Study with Environmental Assessment*.

U.S. Fish and Wildlife Service, 2005. *Biological Opinion of the Proposed Sanibel and Captiva Islands Beach Renourishment Project Located in Lee County Florida*, Service Log No. 4-1-04-F-9180, 39p.

ESTERO BARRIERS

There are 20.6 miles of beaches in the **Estero Barriers** subregion, which extends from the San Carlos Bay Entrance in Lee County to the Lee-Collier County boundary line, as shown on Figure SW.6. There are 7.4 miles of critically eroded beaches in this subregion, of which 2.1 have been restored.

Erosion is attributed to winter frontal systems, tropical weather systems in the Gulf, and the effects of inlets including Matanzas Pass, Big Carlos Pass, New Pass and Big Hickory Pass. The most erosive storms in recent years were Hurricane Agnes (1972), the Subtropical Storm of June 1974, the Subtropical Storm of June 1982, Tropical Storm Bob (1985), Tropical Storm Keith (1988), Tropical Storm Gabrielle (2001), and Hurricane Charley (2004).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

MATANZAS PASS, LEE COUNTY

The navigation channel through Matanzas Pass was completed in 1973 as an extension of the federal **Ft. Myers Beach Navigation Project**. The local sponsor is Lee County. Periodic maintenance dredging of the pass has been conducted with placement of the dredged material along the northern gulf shoreline of Estero Island occurring in 1986, 1998, and 2001. The U.S. Army Corps of Engineers is currently planning the next maintenance dredging of the pass and interior navigation channels.

Strategy: Continue placement of beach compatible sand from the maintenance dredging of Matanzas Pass on Estero Island.

ESTERO ISLAND, LEE COUNTY, R175 (-0.4)-R200

This is a 5.0 mile segment of critically eroded beach on Estero Island that includes Ft. Myers Beach. Sand from the maintenance dredging of Matanzas Pass has been placed along the northern portion of this area.

The federal **Lee County Shore Protection Project** authorizes beach restoration, and associated shore protection structures, as needed, for eroding beaches on Estero Island. The local sponsor is Lee County. The federal project design consists of a beach berm at elevation +4 ft NGVD and constitutes ten years of advance nourishment to protect the existing dune and upland development. In August 1999, the U.S. Army Corps of Engineers completed a General Reevaluation Report for Gasparilla and Estero Islands. The recommended project for the two islands was modified. The Gasparilla Island portion of the Lee County project was constructed in 2007. The modified project provides for restoration of 4.7 miles of shoreline on Estero Island (R175-R199). The project includes a terminal groin at the north end of the island adjacent to Matanzas Pass.

In 2000, engineering design and permitting were initiated to construct the project on a federal reimbursement basis. The design goal was to modify the recommended project by using an offshore borrow area located closer to the project shoreline, increasing the interval between nourishment events. Additional non-federal project features to be included as construction options are restoration on southern Estero Island (R208-R210) and Lover's Key (R215-R221).

Strategy: Construct and then maintain the project through monitoring and nourishment using sand from offshore sources; construct terminal groin.

BIG CARLOS PASS, LEE COUNTY

Big Carlos Pass is located between Estero Island and Lover's Key and connects the Gulf of Mexico with Estero Bay. Sand has been excavated in the vicinity of the Big Carlos Pass ebb shoal as a sand source for the Bonita Beach Nourishment Project.

Strategy: Monitor.

LOVERS KEY, LEE COUNTY, R214-R222

This is a 1.5 mile segment of critically eroded beach on Lovers Key which includes the limits of Lovers Key State Park. In October 2004, a 1.2 mile beach and dune restoration project was conducted on Lovers Key which consisted of placing approximately 590,000 cubic yards between R215 and R220. This material was taken from an offshore borrow site. Lee County is the local sponsor.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources.

NEW PASS, LEE COUNTY

New Pass is hydraulically connected with Big Hickory Pass via Estero Bay and has not been structurally stabilized. In 1994, an inlet management study of New Pass and Big Hickory Pass was completed. Based in part on the study, the ebb shoal of New Pass was dredged as a sand source for the 1995 beach restoration at Bonita Beach.

Strategy: Monitor.

BIG HICKORY PASS, LEE COUNTY

Big Hickory Pass is hydraulically connected with New Pass via Estero Bay. Big Hickory Pass has closed repeatedly and been reopened by storms and mechanical excavation. In 1994, an inlet management study of New Pass and Big Hickory Pass was completed. Based in part on this study, terminal groins were constructed adjacent to Big Hickory Pass at the north end of the Bonita Beach Restoration Project shoreline.

Strategy: Monitor.

LITTLE HICKORY ISLAND, LEE COUNTY, R226-R230.4

This is a 0.9 mile segment of critically eroded beach on Little Hickory Island at Bonita Beach. Beach restoration was completed in December 1995. The non-federal **Bonita Beach Restoration Project** (R226-R230) was constructed along the northern gulf shoreline of Little Hickory Island using sand from the ebb shoal of New Pass. Lee County is the local sponsor. The 0.78 mile project placed approximately 217,000 cubic yards of sand between R225.5 and R230. The project included two terminal groins constructed at the north limits of the beach fill adjacent to Big Hickory Pass. The southern groin was damaged during the passage of Tropical Storm Gabrielle, and was rehabilitated during the summer of 2003.

In June 2004, nourishment was completed along Bonita Beach (R226-R230) using approximately 143,000 cubic yards of sand from the Big Carlo Pass ebb shoal. The project design consists of a beach berm at elevation +5.5 ft NGVD and a dune feature at elevation +6.5 ft NGVD to protect the existing dune and upland development.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore sources.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Lee County, Fort Myers Beach, Bonita Springs, West Coast Inland Navigation District, and the U.S. Army Corps of Engineers. Lover's Key is a State Park managed by the Department's Division of Recreation and Parks. Participants with the Department as sponsors of beach management projects include Lee County, the West Coast Inland Navigation District, and the U.S. Army Corps of Engineers. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple beach nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include:

1. The Gasparilla Island and Estero Island segments of the federal shore protection project should be conducted under a single contract if the same type of dredge vessel can be used for both segments.
2. The construction of non-federal beach restoration projects on southern Estero Island, Lover's Key and Bonita Beach should be included as bid options to contracts for construction of the Estero Island segment.
3. Beach compatible maintenance dredged material from the Ft. Myers Beach navigation project should be used to supplement offshore sand sources for nourishment of Estero Island.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, shorebirds, manatees and both hardbottom/reef habitat and seagrass beds are environmental concerns within this subregion. The timing of construction activities has been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. The emergent shoals at the south end of Estero Island are considered important wildlife habitat. The designation of critically eroded beach on Lover's Key is due in part to the threatened erosion of wetland habitat. Pen shell (*Atrina rigida*) beds were mapped with the locations verified by scuba divers during the design of the Estero borrow area offshore of Carlos Point. The pen shell beds were not incorporated into the footprint of the borrow area and were avoided during construction.

SAND SOURCES

Sand sources to meet the needs of future projects in this subregion over the next 15 years have not been identified. A regional sand search and inventory should be performed to locate and characterize beach compatible sand. A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation projects should be incorporated into the maintenance of the beach restoration projects.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

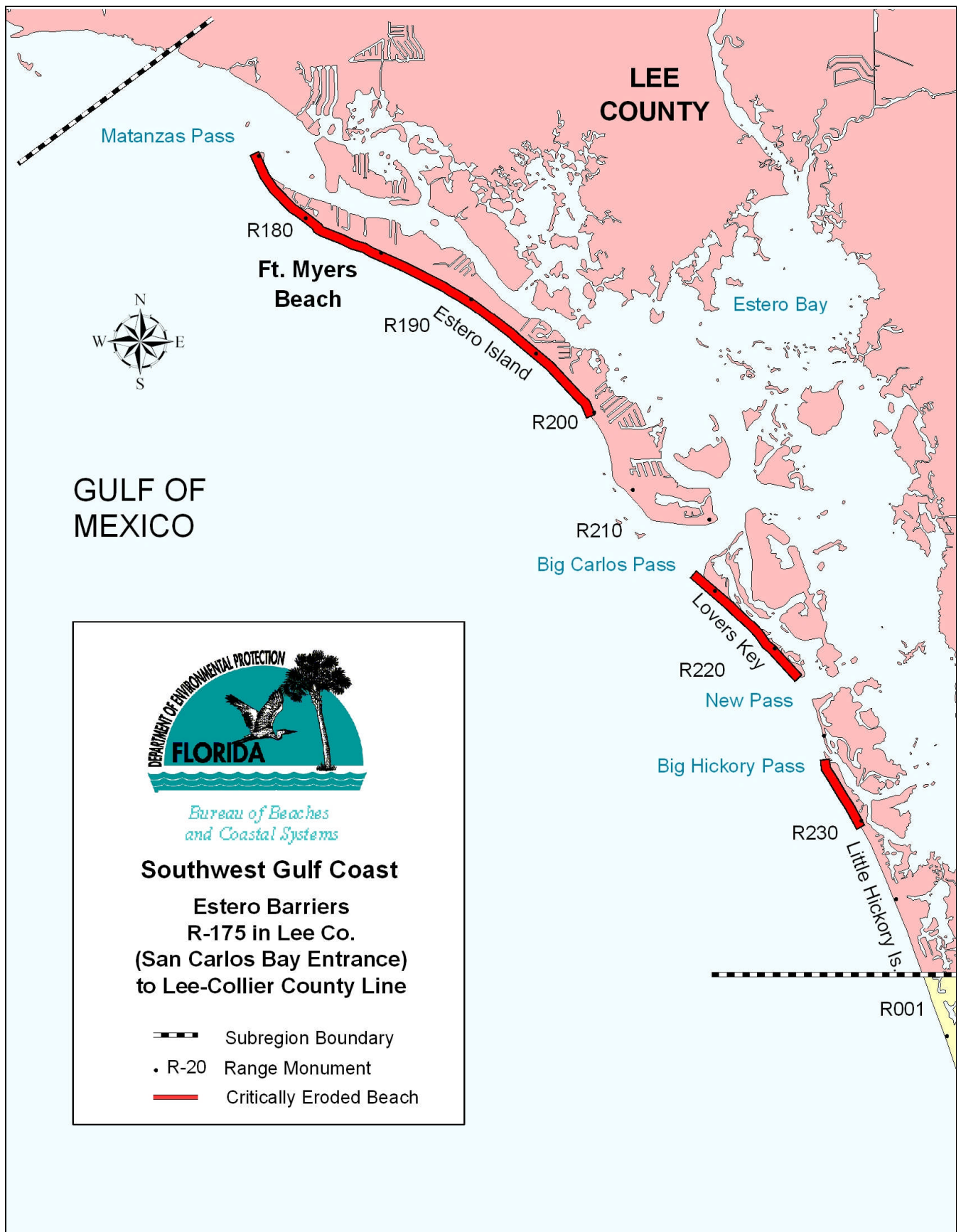


Figure SW.6: Estero Barriers

REFERENCES

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.

Clark, R.R. and LaGrone, J.W., 2004. *Hurricane Charley: Post-storm Beach Conditions and Coastal Impact Report with Recommendations for Recovery and Modifications of Beach Management Strategies*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, 34 pp.

Clark, R.R., LaGrone, J.W., and Koch, J.L, 2006. *Hurricane Wilma: Post-Storm Beach Conditions and Coastal Impact Report*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, 98 p.

Florida Department of Environmental Protection. 2004 *Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection, 2007. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, June 2007.

Humiston and Moore Engineers, 1997. *Estero Island Beach Restoration Study*.

Olsen Associates, Inc., 1994. *New Pass and Big Hickory Pass Inlet Management Plan; Lee County, Florida*.

Scientific Environmental Applications, Inc., 2002. *Bonita Beach Shore Protection Project Geological and Geotechnical Analysis Final Report*, 31p.

U.S. Army Corps of Engineers, 1999. *Lee County, Florida, Shore Protection Project (Gasparilla and Estero Islands), General Reevaluation Report with draft Environmental Impact Statement*.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.

NAPLES COAST

There are 20.6 miles of beaches in the **Naples Coast** subregion, which extends from the Lee/Collier County line to the midpoint of Keewaydin Island (R111), Collier County, as shown on Figure SW.7. There are 8.5 miles of critically eroded beaches in this subregion, of which 5.8 miles have been restored.

Erosion is attributed to winter frontal systems, tropical weather systems in the Gulf, and the effects of inlets including Wiggins Pass, Doctors Pass, and Gordon Pass. The most erosive storms in recent years were Hurricane Agnes (1972), the Subtropical Storm of June 1974, the Subtropical Storm of June 1982, Tropical Storm Keith (1988), Tropical Storm Gordon (1996), Tropical Storm Gabrielle (2001), Hurricane Charley (2004), and Hurricane Wilma (2005).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

WIGGINS PASS, COLLIER COUNTY

Wiggins Pass is a natural inlet and has been open since at least 1885. Prior to 1952, the inlet was subject to periodic closures. In 1952, a south channel was dredged connecting Wiggins Pass through Water Turkey Bay to Vanderbilt Lagoon. From 1984 to 2000, Collier County conducted periodic maintenance dredging to maintain the Wiggins Pass entrance channel at a depth of -8 ft MLW in an area 1,050 ft. long and 200 ft. wide. The dredged sand was placed on the beaches north and south of the inlet. However, the channel fills rapidly, creating unreliable navigable depths. A 1995 study of inlet management alternatives was used to support the County's application for environmental permits to construct navigation and sediment management improvements.

Widening and deepening of Wiggins Pass was completed in July 2000. The improvements included deepening the channel through the ebb shoal to a depth of -12 ft MLW (plus 1 ft allowable overdredge). The channel is scheduled to be hydraulically dredged every two years with approximately 50,000 cubic yards of dredged material placed in the nearshore of Barefoot Beach State Preserve (between approximately R11.4 and R14.2) and on the beaches at Delnor-Wiggins State Recreation Area (between approximately R18 and R20.5). For future maintenance events, dredging of the interior channel is proposed.

Strategy: Place beach quality maintenance dredged material on adjacent beaches north and south of Wiggins Pass within areas of greatest need; monitoring and analysis of inlet effects.

VANDERBILT BEACH, COLLIER COUNTY, R22.3-R30.5

This is a 1.6 mile segment of critically eroded beach at Vanderbilt Beach. In January 1996, the non-federal **Collier County Beach Restoration Project** was completed at Vanderbilt Beach (R23-R30), Park Shore (R50-R54) and Naples (R58-R78) using 323,000 cubic yards of sand from offshore borrow areas. The project design consisted of a beach berm at elevation +5 ft NGVD.

Nourishment of the project was completed in May 2006 and included the placement of 178,000 cubic yards from R21 to R31 in the Vanderbilt Beach segment. The project design consists of a beach berm at elevation +5 ft NGVD to protect the existing dune and upland development. A physical and environmental monitoring program is being conducted.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassing sources.

CLAM PASS, COLLIER COUNTY

Clam Pass is a tidal connection between the Gulf of Mexico and Outer Clam Bay. The initial dredging of the flood shoals in 1999 and maintenance of the flood shoal channel in 2002 and 2007 has resulted in significant improvement to the stability of Clam Pass. Recently a project to restore approximately 568 acres of mangrove estuarine ecosystem (known as the Clam Bay Natural Resource Protection Area) has been completed. The project consisted of enhancing the hydrology of the system by periodically dredging sediments (up to 22,000 cubic yards) constricting the pass and interior waterbodies, placing the beach quality material on the beaches adjacent to Clam Pass (R35-R50), disposing the fine material on the uplands, replacing the three existing culverts on Seagate Drive with new culverts that allow one-way flow to the north, removing nuisance exotic vegetation, performing minor mangrove trimming, conducting small charge blasting to open the restricted interior channels, and implementing studies and programs to identify and reduce the amount of stormwater discharge into the Natural Resource Protection Area.

Strategy: Monitor.

PARK SHORE, COLLIER COUNTY, R50.65-R57.5

This is a 1.3 mile segment of critically eroded beach at Park Shore north of Doctors Pass. In April 1996, the non-federal **Collier County Beach Restoration Project** was completed at Vanderbilt Beach (R22-R30), Park Shore (R50-R54) and Naples (R58-R78) using 91,000 cubic yards of sand from offshore borrow areas. The project design consisted of a beach berm at elevation +5 ft NGVD. The County initiated a program of nourishment using sand from upland borrow areas and inlet bypassing. This program placed approximately 78,000 cubic yards of truck-hauled sand at Park Shore and approximately 5,000 cubic yards of inlet bypassed sand between 1996 and 2003.

Nourishment of the Collier County Beach Nourishment Project was completed in May 2006 and included the placement of 140,000 cubic yards from R48 to R55 in the Park Shore segment. The project design consists of a beach berm at elevation +5 ft NGVD to protect the existing dune and upland development.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassing sources.

DOCTORS PASS, COLLIER COUNTY

In 1960, the City of Naples improved Doctors Pass for navigation by channel dredging and jetty construction. In 1966, the pass was again dredged and the jetties were augmented with rock and sand from the dredging. Maintenance dredging has been conducted about every four years with dredged sand being placed on the beach or inshore zone south of the inlet. In 1996, a sediment impoundment basin was dredged within the ebb shoal and the north jetty was extended by 75 feet, which were recommended in an inlet management study. In 1997, the Department adopted an inlet management plan that specified all dredged material be placed on the beaches or inshore zone south of the inlet meeting a minimum bypassing goal of 10,000 cubic yards on an average annual basis. The City of Naples conducted maintenance dredging of Doctor's Pass in the winter of 2005. Approximately 60,000 cubic yards of dredged sand was placed in the nearshore area south of the inlet, between R60 and R62.

Strategy: Place all beach quality dredged material on the beach or nearshore zone south of the inlet meeting a minimum bypassing goal of 10,000 cubic yards on an average annual basis.

NAPLES, COLLIER COUNTY, R57.8-R89

This is a 5.6 mile segment of critically eroded beach at Naples between Doctors Pass and Gordon Pass. In May 1996, the non-federal **Collier County Beach Restoration Project** was completed along the northern 3.8 miles of shoreline including Vanderbilt Beach (R22-R30), Park Shore (R50-R54) and Naples (R58-R78) using 760,000 cubic yards of sand from offshore borrow areas. The project design consisted of a beach berm at elevation +5 ft NGVD. The project also included removal of numerous degraded groins and the reconstruction of six rock groins and a timber pile groin. In 2000, the City of Naples constructed T-head groins and reconstructed wood plank groins along the gulf shoreline near Gordon Pass (R88-R89). The County initiated a program of nourishment using sand from upland borrow areas and inlet bypassing. This program placed approximately 95,000 cubic yards of inlet bypassed sand and approximately 75,500 cubic yards of truck-hauled sand on the beach at Naples between 1996 and 2003.

Nourishment of the Collier County Project Beach Restoration Project was completed in May 2006 and included the placement of 355,000 cubic yards from R58 to R79 in the Naples segment. The project design consists of a beach berm at elevation +5 ft NGVD to protect the existing dune and upland development. The Collier County project includes construction of 1.09 acres of artificial reef to mitigate for adverse impacts to nearshore hardbottom.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassed from Doctor's Pass; evaluate alternatives to restore the remaining critically eroded shoreline.

GORDON PASS, COLLIER COUNTY

The navigation channel through Gordon Pass is part of a federal navigation project that includes an interior channel from Naples to Big Marco Pass. In 1962, the U.S. Army Corps of Engineers dredged the channel. Groins and armoring have been constructed to protect gulf front development north of the inlet. Maintenance dredging has been conducted by the U.S. Army Corps of Engineers about every seven years with beach quality dredged material placed on the beach 300 feet south of Gordon Pass extending approximately 4,000 feet south on Keewaydin Island.

After the 2003 maintenance dredging event, construction of the south jetty sand tightening project was completed. The project consisted of the following elements: (1) installing approximately 520 linear feet of steel sheet piling along the southern side of the existing jetty, (2) adding additional foundation materials consisting of bedding stone and geotextile composites, and (3) placing additional armor stone consisting of individual units weighing between approximately one and four tons each as necessary to achieve design elevations. Top elevations of the tightened structure range between approximately -2 ft NGVD and +5 ft NGVD. Approximately 800 feet of the jetty was sand tightened. The jetty sustained minor damage during the passage of Hurricane Wilma in October 2005, and was repaired during the summer of 2006.

Strategy: Place beach quality maintenance dredged material on downdrift beaches south of the inlet.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Collier County, the City of Naples and the U.S. Army Corps of Engineers, all of which participate with the Department as sponsors of beach management projects. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple beach nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include maintenance of the Collier County Beach Restoration Project and the Marco Island Beach Restoration Project using offshore sand sources under a single contract in order to reduce equipment mobilization costs.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, gopher tortoise, colonial shorebirds, manatees and both hardbottom/reef habitat and seagrass beds are primary environmental concerns within this subregion. In February 2003, side-scan sonar investigations identified approximately 500 acres of hardbottom formations within 1,000 ft offshore of the Collier County shoreline between R17 and R89. If any impacts are discovered during biological monitoring of the hardbottom in the vicinity of the Collier County Beach Restoration Project, the impacts will be determined to be attributable to the Collier County Beach Restoration Project and mitigation must occur to offset the impacts. The timing of construction activities in this area has been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. Nourishment activities must mitigate for the potential for closure of Clam Pass, through which tidal exchange and flushing maintain water quality in the interior bay and mangrove habitat.

SAND SOURCES

Sand sources to meet the needs of future projects in this subregion over the next 15 years have been identified. A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation projects should be incorporated into the maintenance of the beach restoration projects.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

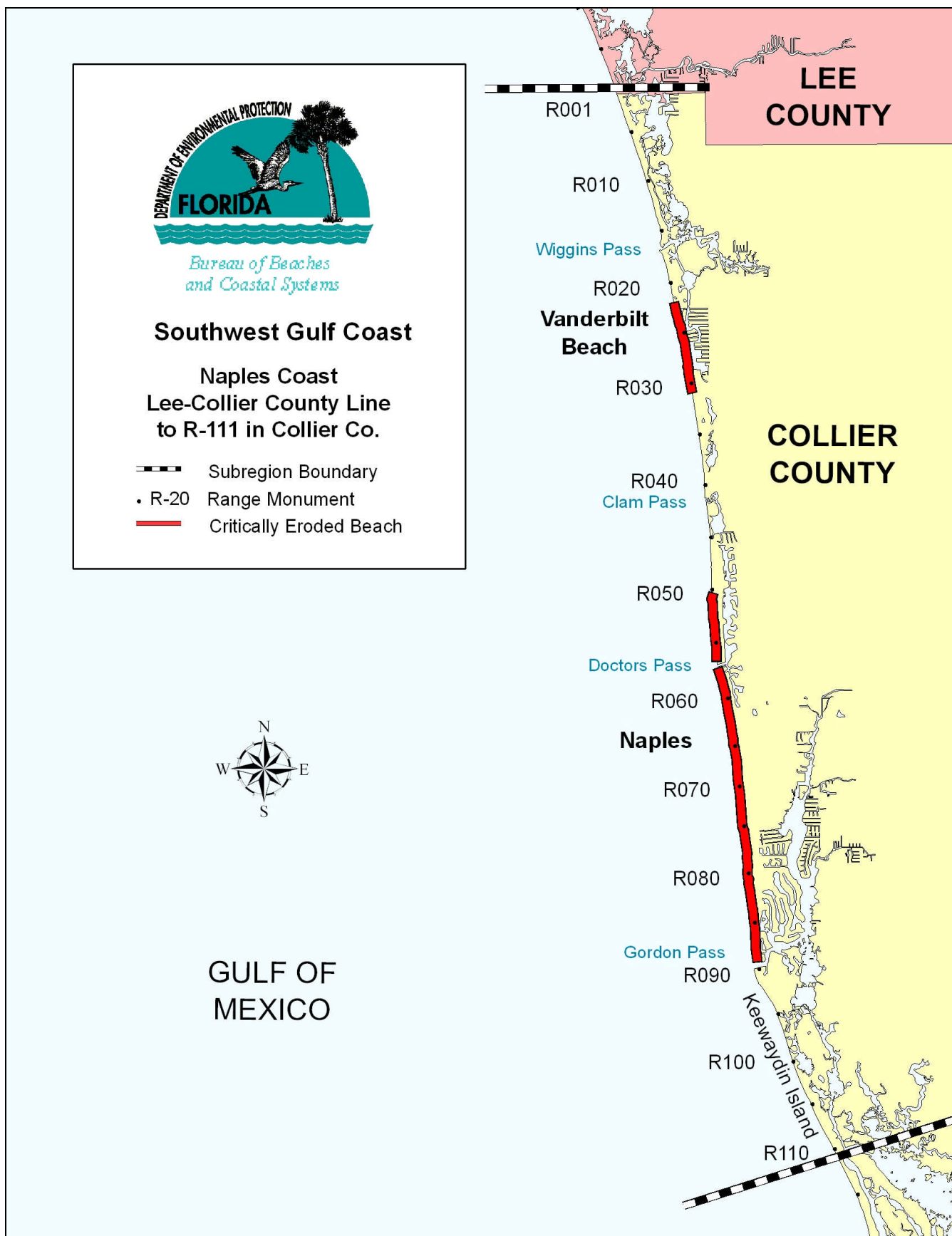


Figure SW.7: Naples Coast

REFERENCES

Antonini, G.A, Fann, D. A., and Roat, P, 2002. *A Historical Geography of Southwest Florida Waterways: volume Two Placida Harbor to Marco Island*. Florida Sea Grant, FLSGP-M-02-003, 168 p.

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.

Clark, R.R., LaGrone, J.W., and Koch, J.L, 2006. *Hurricane Wilma: Post-Storm Beach Conditions and Coastal Impact Report*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, 98 p.

Coastal Planning & Engineering, Inc., 2003. *North Collier County Beach Renourishment Project: Renourishment Engineering Report*, 49p.

Coastal Planning & Engineering, Inc., 1998. *Gordon Pass Inlet Management Study*.

Coastal Planning & Engineering, Inc., 1995. *Wiggins Pass Inlet Management Plan*.

Florida Department of Environmental Protection, 1997. *Doctors Pass Inlet Management Study Implementation Plan*, 8p.

Florida Department of Environmental Protection. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection, 2007. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, June 2007.

Humiston & Moore Engineers, 2006. *Wiggins Pass Monitoring Report June 19-20, 2006 Survey Data*, 23p.

Makowski, C., Lybolt, M., et al., 2003. *North Collier County Beach Renourishment Project: 2003 Marine Resource Investigation Report*, Coastal Planning & Engineering, Inc., 194p.

Moore, B.D., and Humiston, K.K., 1992. *Gordon Pass Jetty Sand-tightening Project*, Proceedings of the 5th Annual National Conference on Beach Preservation Technology, pp. 344-359.

Suboceanic Consultants, Inc., Tackney and Associates, Inc., 1994. *Doctors Pass Comprehensive Inlet Management Plan*.

Turrell, T.T., Hall, T., Cave, K., Lewis, R.R., and Marshall, M.J., 2005. *Clam Bay Restoration and Management Biological Monitoring Report*. Turrell & Associates, Inc., Sixth Annual Report and Lewis Environmental Services, Inc., Report Number 9.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.

SOUTHERN BARRIERS

There are 10 miles of beaches in the **Southern Barriers** subregion, which extend from about the midpoint of Keewaydin Island (R111) to Cape Romano in Collier County, as seen on Figure SW.8. There are 5.6 miles of critically eroded beaches in this subregion, of which 1.7 miles have been restored.

Erosion is attributed to winter frontal systems, tropical weather systems in the Gulf, and the effects of inlets including Little Marco Pass, the Big Marco and Capri Pass inlet system, Caxambas Pass and Blind Pass. The most erosive storms in recent years were Hurricane Agnes (1972), the Subtropical Storm of June 1982, Hurricane Andrew (1992), Tropical Storm Gordon (1995), Tropical Storm Harvey (1999), and Hurricane Wilma (2005).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

LITTLE MARCO, CAPRI, AND BIG MARCO PASS COMPLEX, COLLIER COUNTY

Big Marco Pass is a part of a federal navigation project that includes an interior channel from Naples, although the pass has not been dredged for navigation purposes. It was the sole connection with the Gulf of Mexico between Sea Oat Island and Marco Island until 1967 when Capri Pass opened as an inlet through Sea Oat Island. Capri Pass has become the larger inlet and the severed end of Sea Oat Island, named Coconut Island, has migrated and eroded completely. As Big Marco Pass has diminished, sand from its ebb shoal has migrated toward Marco Island creating an emergent spit called Sand Dollar Island. The management strategy for Big Marco Pass is based in part on an inlet management study that was completed in 1997.

Strategy: Monitor; perform a study of the inlet hydraulics and use of Little Marco Pass ebb shoal as a sand source for beach nourishment.

HIDEAWAY BEACH, COLLIER COUNTY, H3-H11

This is a 0.8 mile segment of critically eroded inlet shoreline at Hideaway Beach on the north coast of Marco Island adjacent to Big Marco Pass. Changes in the Big Marco and Capri Pass inlet system have coincided with erosion of Hideaway Beach (east of R128) on the north end of Marco Island. In 1990 and 1991, the area was included in the non-federal **Marco Island Beach Restoration Project** using sand from borrow areas within the Big Marco/Capri Pass and Caxambas Pass ebb shoals.

In 1997, five temporary groins constructed of sand-filled geotextile groins were installed at two locations. In 2001, two additional temporary sand-filled geotextile groins were installed. Periodic nourishment using sand from upland borrow sites and disposal in the nearshore from the dredging of Collier Creek has been conducted. The effectiveness of the temporary groins in controlling beach erosion was monitored. Monitoring concluded that the groins were effective in extending the longevity of the beach fill and reducing the frequency of nourishment at Hideaway Beach. The temporary groins were removed and replaced with ten permanent T-groins in conjunction with the 2005 **Hideaway Beach Nourishment Project**. In December of 2005, construction of the Hideaway Beach Nourishment Project was completed with the placement of approximately 260,000 cubic yard of sand dredged from the ebb shoal of Big Marco Pass/Capri Pass. The project design consists of a beach berm at elevation +5 ft NGVD to protect the existing dune and upland development. The project included the enhancement and restoration by removal of 3 acres of exotic species within the Rookery Bay National Estuarine Research Reserve to mitigate for adverse impacts to mangroves at the site.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassing sources.

CENTRAL COAST OF MARCO ISLAND, COLLIER COUNTY, R134.5-R139

This is a 0.8 mile segment of critically eroded beach on the central gulf coast of Marco Island. In 1990 and 1991, the area was included in the non-federal **Marco Island Beach Restoration Project** using sand from borrow areas within the Big Marco, Capri Pass and Caxambas Pass ebb shoals. Completed in February 1991, the project placed 1,260,000 cubic yards of sand along the 2.64 miles including the North Marco Island shoreline adjacent to Big Marco Pass, from R135 to R139 and from R143 to R148.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassing sources.

SOUTHERN COAST OF MARCO ISLAND, COLLIER COUNTY, R143-R148

This is a 0.9 mile segment of critically eroded beach on the southern gulf coast of Marco Island. Beach restoration and terminal shore protection structures have been completed. In 1990 and 1991, the area was included in the non-federal **Marco Island Beach Restoration Project** using sand from borrow areas within the Big Marco/Capri Pass and Caxambas Pass ebb shoals. Completed in February 1991, the project placed 1,260,000 cubic yards of sand along the 2.64 miles including the North Marco Island shoreline adjacent to Big Marco Pass, from R135 to R139 and from R143 to R148. The project also included terminal groins constructed at the southwest end of Marco Island (R149). In 1997, breakwaters were constructed offshore of the terminal groins and additional sand from the Caxambas Pass borrow area was placed within the south beach segment of the Marco Island Beach Restoration Project. During the winter of 2006, approximately 180,000 cubic yards of beach quality sand was excavated from the Caxambas Pass borrow and placed on the beach of South Marco Island between R144 and R148.

Strategy: Maintain the project through monitoring and nourishment using sand from offshore and bypassing sources.

CAXAMBAS PASS, COLLIER COUNTY, V23-V31.4

Caxambas Pass is a natural inlet that has not been altered or maintained for navigation, but was dredged as a borrow area for beach restoration of Marco Island in 1991 and 1997. An inlet management study was completed in 1996. In 1997, sand from the Caxambas Pass borrow area was placed within the south beach segment of the Marco Island Beach Restoration Project.

Strategy: Monitor; continue to use Caxambas Pass as a sand source for nourishment.

KICE ISLAND, COLLIER COUNTY, V23-V31.4

This is a 1.6 mile segment of critically eroded beach on Kice Island. Kice Island is a southern barrier island in Collier County where erosion has progressed into backshore mangrove forest resulting in the loss of beach wildlife habitat.

Strategy: Monitor.

BLIND PASS, COLLIER COUNTY

Blind Pass is a natural inlet located between Kice Island and Morgan Island.

Strategy: Monitor.

MORGAN ISLAND, COLLIER COUNTY, V33.8-V41.8

This is a 1.5 mile segment of critically eroded beach on Morgan Island. Morgan Island is a southern barrier island in Collier County where erosion has progressed into backshore mangrove forest resulting in the loss of beach wildlife habitat.

Strategy: Monitor.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

This subregion contains the governmental entities of Collier County, Marco Island and the U.S. Army Corps of Engineers. The County has participated with the Department as the local sponsor of beach management projects. The Hideaway Beach Project was not cost-shared with the Department due to the project not meeting the funding eligibility criteria. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple beach nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. At this time, no opportunities for coordinating projects in this subregion have been identified.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, colonial shorebirds, manatees, mangroves, and seagrass beds are primary environmental concerns within this subregion. The timing of construction activities has been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to the listed species and their habitat. Nourishment activities must avoid potential impacts to the emergent shoals at the northwest end of Marco Island and within Caxambas Pass, which are considered critical wildlife habitat for shorebirds. Large numbers of shorebirds nest and roost on the numerous sandbars in the area of South Marco Island. Wildlife and protected species surveys for the project area have documented nesting by least terns (threatened), snowy plovers (threatened), American oystercatcher (species of special concern), black skimmers (species of special concern), and Wilson's plovers, on the beaches of Collier County. These beaches are also used as resting/foraging habitat for other species of shorebirds including the threatened piping plover. The Rookery Bay Aquatic Preserve and National Estuarine Research Reserve include Kice and Morgan Islands and surrounds, but does not include, Marco Island. Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.

SAND SOURCES

Sand sources to meet the needs of future projects in this subregion over the next 15 years have been identified. A regional sediment management strategy that uses beach quality sand from upland dredged

material management areas and the maintenance dredging of the navigation projects should be incorporated into the maintenance of the beach restoration projects.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

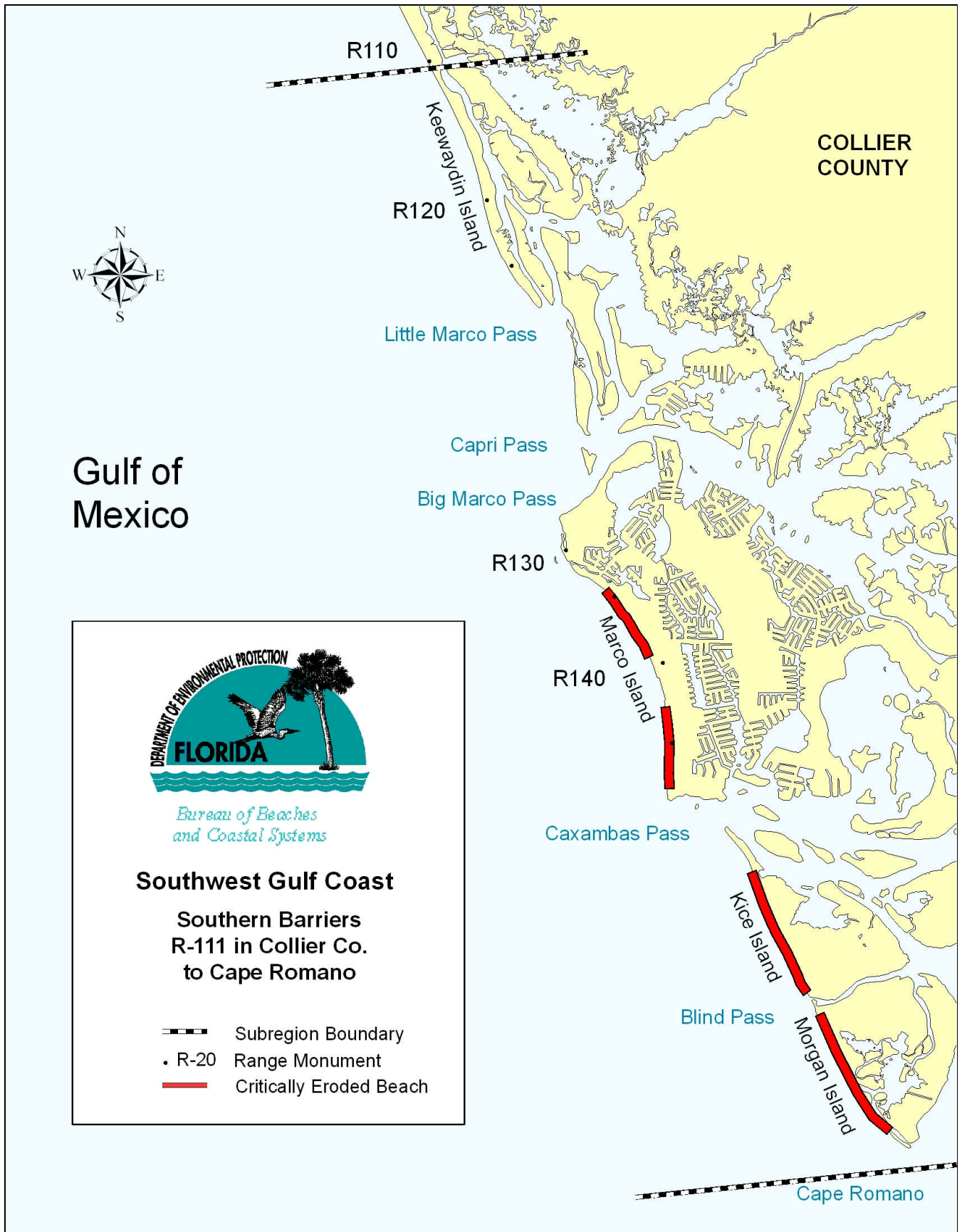


Figure SW.8: Southern Barriers

REFERENCES

Antonini, G.A, Fann, D. A., and Roat, P, 2002. *A Historical Geography of Southwest Florida Waterways: volume Two Placida Harbor to Marco Island*. Florida Sea Grant, FLSGP-M-02-003, 168 p.

Clark, R.R., 1982. *Coastal Damage Associated with Subtropical Storm, June 18, 1982*, Florida Department of Natural Resources, Bureau of Beaches and Shores, Post-storm Report 82-1, 34 p.

Clark, R.R., LaGrone, J.W., and Koch, J.L, 2006. *Hurricane Wilma: Post-Storm Beach Conditions and Coastal Impact Report*, Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, 98 p.

Coastal Engineering Consultants, Inc., 1996. *Caxambas Pass Inlet Management Plan*.

Florida Department of Environmental Protection, 2004. *2004 Hurricane Recovery Plan for Florida's Beach and Dune System*, 65 p.

Florida Department of Environmental Protection, 2007. *Critically Eroded Beaches in Florida*, Bureau of Beaches and Coastal Systems, April 2007.

Humiston & Moore Engineers, P.A., 1997. *Big Marco and Capri Pass Inlet Management Study*.

Humiston, K.K., 1988. *The Effects of the Growth and Migration of Big Marco Pass Ebb Tidal Shoals on Marco Island Beaches*, Proceedings of the 1st Annual National Conference on Beach Preservation Technology, pp. 375-381.

Moore, B.D., 1999. *T-groin Design and Performance as an Erosion Control Alternative at Two Florida Gulf Coast Inlets*, Proceedings of the 12th Annual National Conference on Beach Preservation Technology, pp. 187-203.

Moore, B.D., 1993. *Channel Reformation at Big Marco Pass, Collier County, Florida*, Proceedings of the 6th Annual National Conference on Beach Preservation Technology, pp. 161-174.

Stephen, M.F., 1981. *Effects of Seawall Construction on Beach and Inlet Morphology and Dynamics at Caxambas Pass, Florida*, University of South Carolina, Geology Department, Dissertation.

U.S. Army Corps of Engineers, 1998. *Water Resources Development in Florida*.